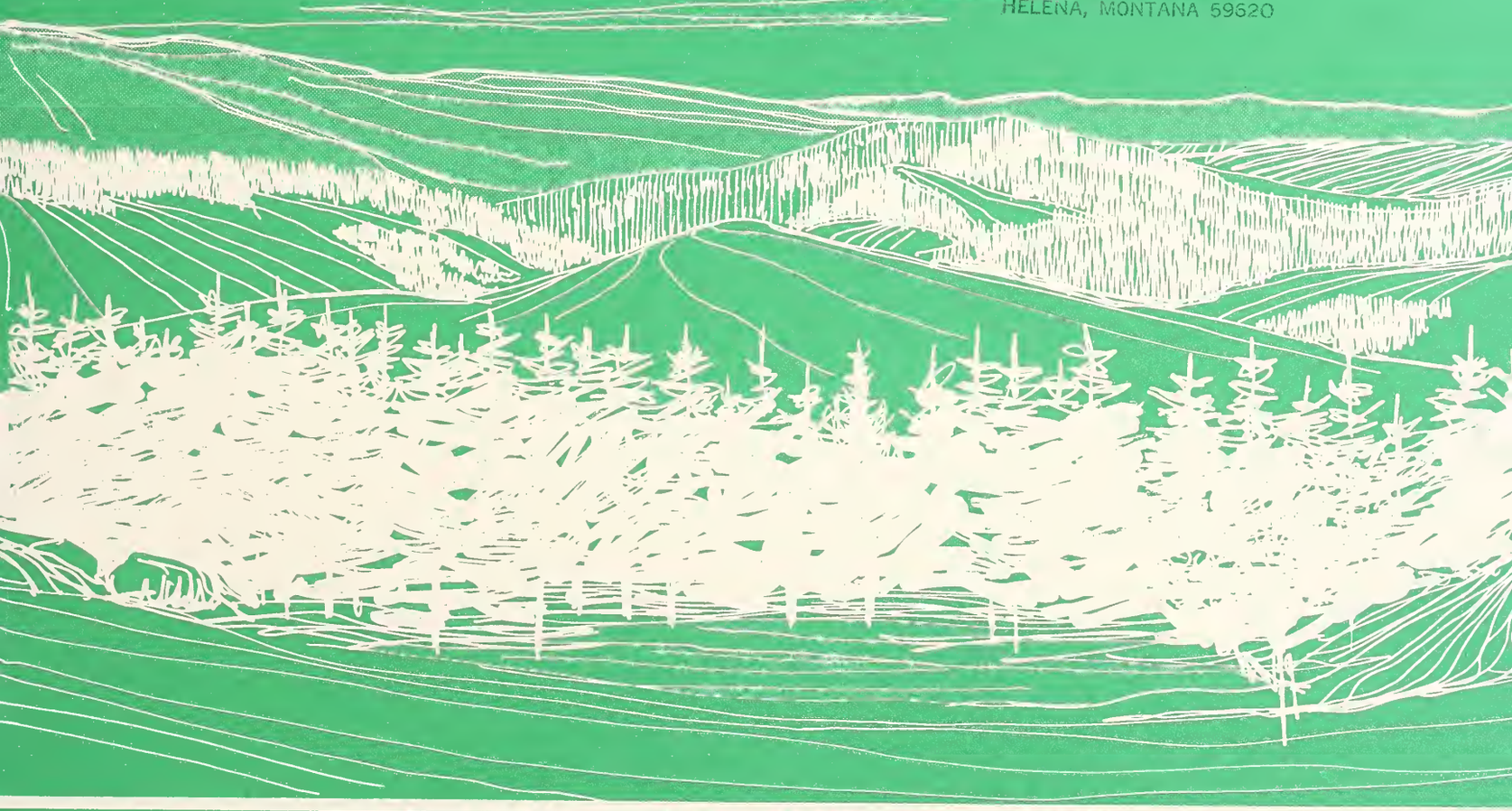
# Montana Tunnels Project
# Notice of Adoption of
# Draft Environmental Impact Statement





## Montana Department of State Lands

Type of Statement:

Notice of Adoption of the Draft Environmental Impact Statement

Prepared by:

Montana Department of State Lands

Proposed Action:

Centennial Minerals, Inc., and U.S. Minerals Exploration Co. have filed joint venture plans with the Montana mine and mill known as the Montana Tunnels project. The project, planned for a 1,549-acre permit area west of Jefferson City, Montana, would last 12 to 13 years, including construction. The mine would produce 15,000 tons of ore per day, 7 days per week, for at least 10 years. The plant would produce gold and silver bullion, including lead and zinc concentrates. Employment for the project would peak at 551 jobs during construction; 340 jobs would be provided annually during peak operations.

More Information:

For additional information or copies of this Notice, please call or write:

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Draft Environmental Impact Statement

Notice of Adoption

January 1986

# MONTANA TUNNELS PROJECT



Montana Department of State Lands

Dennis Hemmer, Commissioner

# Notice of Adoption of

# the

# Draft Environmental Impact Statement

The Montana Department of State Lands (DSL) issued a draft environmental impact statement (EIS) on November 27, 1985, for the Montana Tunnels Project, a joint venture gold, silver, lead, and zinc mine proposed by Centennial Minerals Inc. and U.S. Minerals Exploration Company. The public and interested parties were asked to comment on the draft EIS during a 30-day comment period that ended December 30, 1985.

DSL held public meetings on May 13 and December 18, 1985, in Clancy, Montana, to air public concerns about the proposed Montana Tunnels project. At the May meeting, DSL and the applicant presented an overview of the environmental impact statement and public involvement processes. The meeting on December 18th was a public hearing where DSL accepted testimony on the draft EIS.

The record of public comment discloses no new information or environmental issues, nor omissions or errors in the draft EIS that warrant substantive changes in DSL's analysis or conclusions. Therefore, it is DSL's decision not to prepare a final EIS and, instead, to adopt the draft EIS pursuant to Rule 26.2.606 ARM.

Furthermore, after careful consideration of the public's comments and the draft EIS, DSL's proposed course of action is to approve for operation either alternatives 2 or 3, the preferred alternatives. The Summary from the draft EIS has been reproduced in this document for the reader's convenience.

Included in this document are also the letters and testimony received on the draft EIS and DSL's responses to them.

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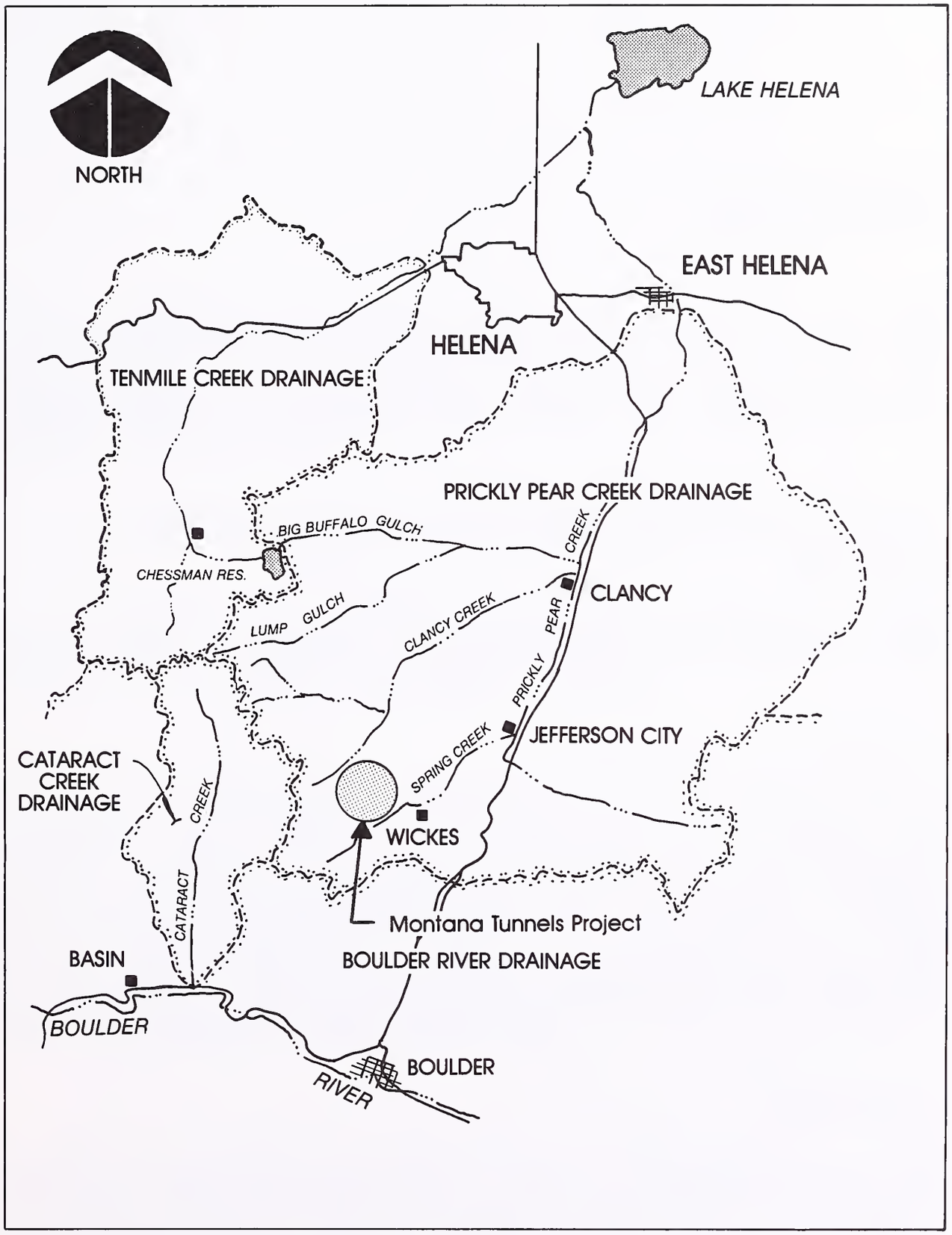


***Figure 1***

*The proposed Montana Tunnels project would operate near Jefferson City, Montana, south of Helena.*

# Summary

Centennial Minerals, Inc., and U.S. Minerals Exploration Co. have filed joint venture plans with the Montana Department of State Lands (DSL) to build and operate a gold mine and mill known as the Montana Tunnels project. DSL must decide whether to approve the permit as applied for, approve the permit with modified mining or reclamation plans, approve the permit subject to stipulations, or deny the permit.

## COMPARING ALTERNATIVES AND SELECTING THE PREFERRED ALTERNATIVE

### The Choices

The environmental impact statement analyzes four alternatives, one of which is the applicant's proposal. The following discussion presents a summary of each alternative and DSL's preferred alternative.

### Alternative 1 (The Proposal)

The applicant would construct and operate an open-pit, precious-metals mine according to the plan described in the application for a hard-rock mine operating permit. The project would last for 12 to 13 years. Construction and operation of the open-pit mine would disturb 965 acres of land, including 245 acres for the tailings impoundment and 421 acres for the waste rock dump. The mine would produce 15,000 tons of ore per day. The applicant would build an ore-processing plant that would produce gold and silver bullion and lead and zinc concentrates. At the end of mining, the applicant would remove all buildings and structures and reclaim land disturbed by the tailings impoundment, haul roads, waste rock dump, and plant site.

### Alternative 2

The applicant's mining and reclamation plan would be the same as in alternative 1 (the proposal), except that a series of mitigating measures are assumed to be a part of the plan. The measures would help to: a) protect existing downstream water users, b) protect aquatic life and fisheries in upper Spring Creek, c) reduce seepage from the water retention pond, d) prevent revegetation failure on the reclaimed tailings surface, e) prevent

channel erosion next to the reclaimed waste rock dump, f) improve postmining wildlife habitat, g) insure forage supply for mule deer, h) reduce wildlife impacts, and i) reduce traffic hazards and inconveniences.

Alternative 3

The applicant's proposed production system arrangement--with an open pit, waste rock dump, tailings impoundment, water retention pond, and process plant--would combine elements of alternatives 1 (the proposal) and 2, but the ore processing plant would be located about 1/3 mile to the northeast of the proposed plant site, nearer to the permit boundary. Mitigating measures described in alternative 2 would be the same.

Alternative 4 (Denial of the Permit)

The applicant would not develop the Montana Tunnels project. The environmental, social, fiscal, and economic conditions (described in Chapter III of the EIS) would not be affected by the applicant's project.

The Comparison

General effects of the alternatives, including the proposal, are listed in table 1. Alternatives 1, 2, and 3 would have similar effects on the environmental and socioeconomic conditions; however, the mitigating measures for alternatives 2 and 3 would reduce a number of potential impacts of the proposal. Adverse impacts which cannot be mitigated or otherwise avoided by changing the production system arrangement (unavoidable impacts) include the following:

--submergence of an open pit, creating a large lake containing poor-quality water,
--disturbance of 932 acres of existing soils, vegetation, and wildlife habitat,
--reduction of flows in Clancy Creek, lower Spring Creek, and Prickly Pear Creek,
--removal of numerous intermittent springs,
--reduced aesthetic qualities due to visual changes brought about by the pit, waste rock dump, and tailings impoundment, and the views of these disturbances from nearby areas,
--increased potential for land use mismanagement due to a reclaimed landscape that is more susceptible to drought than the premining landscape,
--reduction in the usefulness of the postmine landscape,
--displacement of mule deer and elk,
--increased traffic.

As a result of denial of the permit, the landscape, vegetation, and soils would continue to provide uses similar to current uses. The historic mining character and agricultural and forest setting of the project area would dominate the area.

Denial would forego up to 551 quarterly job opportunities in construction and 340 annual jobs during mining that largely would benefit local residents

because of the applicant's commitment to hire at least 80 percent of the work force locally. In addition, the area economy would not receive the benefits of increased personal income--amounting to $3.3 to $4.4 million during the first operational phase and $4.8 to $6.5 million during the second phase (an increase from 1 to 3 percent). Historic income and employment trends would continue--with income rising about 2 percent annually (real growth) and employment increasing about 1 percent annually. Also, the area would not be subject to the cyclical expansions and contractions of the mining industry. The annual project property tax revenues collected by Jefferson County and some of its political subdivisions, and project revenues paid to the state would not increase under this alternative.

### The Preferred Alternatives

Based on a comparison of the environmental, social, and economic advantages and disadvantages of each alternative, alternatives 2 and 3 are preferred.

## SUMMARY OF IMPACTS BY DISCIPLINE

The following briefly describes the impacts that could occur if the Montana Tunnels project were permitted under applicable alternative scenarios.

### Geology

#### Alternative 1

The combined flows of Homestake and Pen Yan creeks during flood events would be more than a small natural channel of an unnamed drainage could handle. Erosional downcutting and widening of the small, steep channel would occur during large runoff events.

Over time, slump failures, rock falls, and erosional processes within the open pit would slowly reshape the pit walls to a more stable slope angle. The post-reclamation landscape of the waste dump and tailings impoundment would not be subject to excessive erosion nor mass failures. However, the channel over the reclaimed impoundment would gradually downcut, resulting in a landscape slightly less stable than before mining.

#### Alternative 2 or 3 (Preferred)

The impacts for alternative 2 or 3 would be the same as alternative 1 except that potential for channelization of waste rock diversion channels would be minimized.

Table 1: Effects of Alternatives

| Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|
| --Moderately unstable postmining landform conditions. | --Slightly unstable postmining landform conditions. | --Slightly unstable postmining landform conditions. | --Stable landform. |
| --Temporary displacement of agricultural and recreational land uses. | --Temporary displacement of agricultural and recreational land uses. | --Temporary displacement of agricultural and recreational land uses. | --Agricultural and recreational land uses retained. |
| --Usefulness of the postmining landscape reduced. | --Minimized reduction in the usefulness of the postmining landscape. | --Minimized reduction in the usefulness of the postmining landscape. | --Usefulness of the landscape retained. |
| --Temporary displacement of mule deer and elk. | --Minimized temporary displacement of mule deer and elk. | --Minimized temporary displacement of mule deer and elk. | --Continued use of year-round ranges by mule deer and elk. |
| --Reduced acreages and quality of postmining wildlife habitats. | --Minimized reduction in the acreages and quality of postmining wildlife habitats. | --Minimized reduction in acreages and the quality of postmining wildlife habitats. | --Existing acreages and the quality of wildlife habitat retained. |
| --Temporary degradation of aquatic habitat in upper Spring Creek. | --Existing aquatic habitat conditions retained in upper Spring Creek. | --Existing aquatic habitat conditions retained in upper Spring Creek. | --Existing aquatic habitat conditions retained in upper Spring Creek. |
| --Temporary water availability conflict with Corbin water supply and downstream irrigators on Prickly Pear Creek. | --Existing water availability conditions retained. | --Existing water availability conditions retained. | --Existing water availability conditions retained. |
| --Destruction of six cultural historic sites. | --Destruction of six cultural historic sites. | --Destruction of six cultural historic sites. | --Historic sites retained; sites would continue to deteriorate due to weathering, vandalism, and relic collecting. |
| --Slight increase of air pollutant concentrations (TSP) above existing ambient levels. | --Increase of air pollutant concentrations would be minimized. | --Increase of air pollutant concentration would be minimized. | --Existing air quality levels would remain unchanged. |

| | | | |
|---|---|---|---|
| --Large open pit and sparse vegetation on reclaimed tailings impoundment visible from surrounding higher elevation areas. Agriculture and forest setting replaced by an industrial-urban setting. | --Large open pit visible from surrounding higher elevation areas. Agriculture and forest setting replaced by industrial-urban setting. | --Large open pit visible from surrounding higher elevation areas. Agriculture and forest setting replaced by industrial-urban setting. | --Views of historic mining properties, agriculture, and forest lands retained. |
| --Substantial traffic increases on Jefferson City--Wickes county road. | --Traffic volume reduced on Jefferson City--Wickes county road. | --Traffic volume reduced on Jefferson City--Wickes county road. | --Historic rates of traffic growth continue, between 1 to 3 percent annually. |
| --Small increase in population over baseline estimates. | --Small increase in population over baseline estimates. | --Small increase in population over baseline estimates. | --Stable 1 to 2 percent growth rate. |
| --Increased employment including 340 new full-time jobs at peak production and 168 to 224 secondary jobs. | --Increased employment including 340 new full-time jobs at peak production and 168 to 224 secondary jobs. | --Increase employment including 340 new full time jobs at peak production and 168 to 224 secondary jobs. | --Forgo 340 new full-time, mine-related jobs and 168 to 224 secondary jobs. |
| --Increased personal income (1 to 3 percent) from mine-related and secondary income contributions to the area economy. | --Increased personal income (1 to 3 percent) from mine-related and secondary income contributions to the area economy. | --Increased personal income (1 to 3 percent) from mine-related and secondary income contributions to the area economy. | --Forgo income contributions to the economy. |
| --Increased enrollment in Jefferson County and Lewis and Clark County schools. | --Increased enrollment in Jefferson County and Lewis and Clark County schools. | --Increased enrollment in Jefferson County and Lewis and Clark County schools. | --School enrollment would follow present trends. |
| --Higher tax and service revenues for some local government jurisdictions. | --Higher tax and service revenues for some local government jurisdictions. | --Higher tax and service revenues for some local government jurisdictions. | --No increased county or local government revenues. |
| --Increased revenues to state. | --Increased revenues to state. | --Increased revenues to state. | --No increased state revenues. |

## Hydrology

### Alternative 1

Excavation of the 162-acre, open pit would affect existing ground water flows; as many as 10 springs would be physically destroyed. Flow in springs within a one-mile radius of the open pit could be temporarily reduced. The pit would also induce ground water seepage from Clancy Creek. During the life of the mine, no more than 90 gallons per minute would seep into the pit from Clancy Creek. This flow would eventually decrease to about 10 gallons per minute. Water users downstream whose water rights pre-date the applicant's (senior appropriators) could be affected during low-flow periods.

After mining, the pit would continue filling with poor-quality water for about 480 years. Upon reaching equilibrium, water in the pit would be about 610 feet deep with a surface area of 103 acres. About 15 gallons per minute of poor-quality water would begin seeping into the ground water system.

Continuous pumping of the ground water production wells near Spring Creek could temporarily dewater a reach of this creek containing a population of small trout.

The depletion of flow in Spring Creek would diminish the flow of Prickly Pear Creek and potentially affect downstream senior appropriators during periods of low flow.

Seepage from the tailings disposal facility would occur through the base of the impoundment as well as through the process water retention pond. Seepage through the tailings impoundment would most likely end up as storage in unsaturated alluvium. Seepage through the process water retention pond is considered significant and may cause an increase in the concentration of heavy metals and total cyanide reaching Spring Creek. The concentration of arsenic, which already exceeds drinking water criteria, could also increase.

Drainage of poor quality water from the tailings impoundment into the process water retention pond could continue for at least five years after mine closure.

### Alternative 2 or 3 (Preferred)

The impacts of these alternatives would be the same as alternative 1 except that seepage of poor-quality water from the process-water retention pond would be significantly reduced. Spring Creek would not become dewatered above Corbin.

## Aquatics

### Alternative 1

During mining, streamflow depletions could destroy macroinvertebrates and diatoms in Spring Creek or reduce their diversities. Reestablishment of aquatic communities in upper Spring Creek may be inhibited for 5 to 10 years after mining as contaminated seepage water from the retention pond reaches Spring Creek.

Streamflow depletions in upper Spring Creek could reduce abundance and diversities of aquatic communities in Prickly Pear Creek between Jefferson City and Clancy Creek.

Alternatives 2 or 3 (Preferred)

Streamflow depletions would not occur in upper Spring Creek. However, depletions of streamflow in lower Spring Creek could reduce abundance and diversities of aquatic communities in Prickly Pear Creek between Jefferson City and Clancy Creek.

## Fisheries

Alternative 1

Dewatering Spring Creek could destroy or reduce a population of small trout. Those fish that escape the dewatering would be forced into inadequate habitat. Although Spring Creek flows would reestablish after mining, levels of cyanide may prevent repopulation by fish for 5 or 10 years. Reductions in the flow of Clancy and Prickly Pear creeks would not be great enough to affect fish.

Alternative 2 or 3 (Preferred)

Reductions in the flows of Clancy Creek and Prickly Pear Creek would not be great enough to affect fish. Trout habitat in Spring Creek would not be altered.

## Soils

Alternative 1

Soils replaced at the surface of the tailings would probably become acidified and contaminated by trace elements over several decades, a process which would adversely affect plant growth. This, in turn, would result in progressively increasing erosion rates on the surface of the impoundment. In a worst-case scenario, most or all of the vegetation on the surface of the tailings could fail after several decades.

For all disturbed areas, postmining infiltration and percolation rates would be lower than premining rates. This change would result in higher runoff and erosion. The reclaimed lands would probably be more susceptible to mismanagement and drought than before disturbance. Natural soil development processes would eventually correct these impacts. Biological soil impacts would occur in most of the soils that are disturbed in the permit area. This could result in lower plant species diversity until soil microorganisms invade the reclaimed areas. Soil loss due to erosion off of the waste rock dump slopes, tailings dam, and cut-and-fill slopes would be low to moderate initially, and would decrease as vegetation becomes established. Postmining soil water- and nutrient-holding capacities would be low. This could lead to a less dense vegetative cover than existed before mining. Water- and nutrient-holding capacities would increase as the soil organic matter content increases naturally.

Alternative 2 or 3 (Preferred)

The impacts of this alternative would be the same as those described in alternative 1 with the exception that soil acidification would be mitigated by capping the surface of the tailings impoundment with waste rock. Reclamation on the surface would be successful.

Vegetation

Alternative 1

Mining would destroy 932 acres of existing vegetation and 33 acres of previously disturbed lands. The postmining environment would contain significantly reduced acreages of grassland and forests. This decrease would correspond with a proposed increase in shrub/grassland acres, the creation of the open pit, and the potential failure of seeded grassland on the tailings site--this last due to acidification of soil. Lowered soil quality would limit the initial growth of seeded plants throughout revegetated areas; however, an erosion-controlling ground cover would develop over time. The vegetational composition of reclaimed lands would be dominated by relatively few species. Shrub densities would be far below premining densities and some shrub species would be eliminated. Reductions in tree densities, especially for Douglas-fir, would be noticeable. Several decades would be required for planted trees to reach premining heights. Over time, plant and woody species diversities would increase. Problems that could be encountered during revegetation include occasional erosion on steep slopes, introduction of weeds, and damage to developing plants by wildlife.

Alternative 2 or 3 (Preferred)

The impacts of this alternative would be the same as those described in alternative 1 except that the establishment of grassland on the tailings impoundment site would probably be successful. Also, the densities of conifers in reestablished forest would be comparable to premining density.

## Wildlife

### Alternative 1

Mining would destroy 932 acres of existing wildlife habitat. Mining activity and loss of summer range would force mule deer into surrounding habitats. Elk that use a winter-concentration area adjacent to the mine would move west to avoid mining activity. Mule deer and elk may eventually become accustomed to mining activity and begin using habitats near the permit area. Other wildlife species would undergo a similar displacement and habituation process.

Possible failure of 195 acres of reestablished grassland on the tailings impoundment site together with the excavation of a 162-acre open pit would significantly reduce wildlife habitat in the permit area. The quality of wildlife cover in reclaimed lands would be lowered due to reduced densities of shrubs and conifers. Mule deer, however, may benefit from the increased acreage of foraging habitat. Small increases in poaching, wildlife harassment, and road kills are anticipated.

### Alternative 2 or 3 (Preferred)

The impacts of this alternative would be the same as those described in alternative 1 except that the grassland habitat on the tailings impoundment site probably would not fail. Also, the quality of coniferous cover would be comparable to premining cover quality.

## Air Quality

### Alternative 1

With the proposed emission control practices, the operation of the Montana Tunnels project would meet all Montana and Federal Ambient Air Quality Standards. There would be a slight increase in suspended particulate and trace-element levels in the ambient air, decreasing with distance from the project.

### Alternative 2 or 3 (Preferred)

The emissions of fugitive dust on the access road would be reduced by a mitigating measure restricting traffic along this road.

## Employment and Income

### Alternatives 1, 2, or 3

The project would create 340 full-time jobs at peak operation. Total personal income in the study area due to direct project employment would total $4.8 to $6.5 million, adding 1.5 to 3.5 percent total employment in the study area. Secondary employment as a result of the project would create about 168 to 224 jobs and about $1.8 to $2.4 million annually in personal income in the

study area. Total personal income would increase 1 to 3 percent above levels without the project.

## Land Use

### Alternative 1

The 1,549-acre permit area would be closed to all activities unrelated to mining for the life of the operation. As a result, between 282 and 401 animal unit months (AUMs) of grazing would be lost temporarily. The postmining landscape would contain reduced amounts of grassland and forest. Under a worst-case scenario, 7 acres of agricultural land in Jefferson County and between 10 and 17 acres of agricultural land in Lewis and Clark County would be converted to residential uses. Land-use conversions of this magnitude would be insignificant to agricultural production in Jefferson and Lewis and Clark counties.

As proposed, the mine and associated facilities would disturb a total of 965 acres--887 acres of native vegetation, 45 acres of cropland, and 33 acres of previously disturbed land. About 357 acres of the disturbance area (37 percent) would not be returned to its original land use. Because of this, about 40-60 AUMs of grazing would be lost permanently, and other agricultural uses would be precluded in this 357-acre area.

### Alternative 2 or 3 (Preferred)

Impacts under alternative 2 would be the same as those listed under alternative 1 with the exception that the number of acres permanently lost would be reduced to the 162-acre open pit.

## Sociology

### Alternative 1, 2, or 3

Any adverse impacts on the sociology of the study area would be related directly to the number and distribution of workers moving into the area. Assuming the projected number and distribution of in-migrant workers presented in the demography section of this report, the only anticipated adverse impacts on the sociological environment would occur in community services (law enforcement and solid waste pickup) in rural Jefferson County.

In the unlikely event that a disproportionate number of workers should move to and reside in one area (for example, Eastgate near East Helena) adverse impacts could be expected in education and other community services.

Lewis and Clark County is not expected to suffer any adverse effects on the sociological environment. Government employment dominates the demography and social life of this county. In addition, the present availability of community services and housing is sufficient to handle project-related employees.

## Recreation

Alternative 1, 2, or 3

The 1,549-acre permit area would be closed to the public for the life of the mine. However, the surrounding area offers diverse and abundant recreational opportunities, so this aspect of the project is insignificant.

## Cultural Resources

Alternative 1, 2, or 3

Six historic sites would be destroyed by the project. Two of the historic sites, the Washington Mine and the Minah Mine, have been nominated for listing on the National Register of Historic Places. Three other historic sites would not be directly affected by the project. However, the sites could be affected indirectly by added vandalism or collecting due to increased activity in the area.

## Aesthetics and Noise

Alternative 1

The project would be visible from parts of the Elkhorn Mountains to the east, as well as Mount Thompson and points along the Occidental Plateau to the southwest. Noise levels would increase over background levels due to project-related equipment and traffic.

Alternative 2 or 3 (Preferred)

The impacts under these alternatives would be the same as under alternative 1, except that decreased mine traffic would result in reduced noise levels.

# Comments and Responses

Letter 1--U.S. Department of the Interior, U.S. Geological Survey
Letter 2--Allen R. McKenzie
Letter 3--Montana Chamber of Commerce
Letter 4--Charles Popovich
Letter 5--U.S. Department of Health and Human Services
Letter 6--U.S. Department of the Interior, Bureau of Land Management - Jack A. McIntosh
Letter 7--Helena Area Chamber of Commerce
Letter 8--Tim Byron
Letter 9-U.S. Department of the Interior, Fish and Wildlife Service
Letter 10-Steve and Teri Johnsen
Letter 11-Forest Park Water Users Assoc. - Richard Chess
Letter 12-Janet Lyon
Letter 13-Allen R. McKenzie
Letter 14-Montana Department of Natural Resources and Conservation
Letter 15-Montana Department of Fish, Wildlife & Parks - Glenn R. Phillips
Letter 16-Montana Department of Fish, Wildlife & Parks - Robert R. Martinka
Letter 17-U.S. Department of the Interior, Bureau of Land Management - John A. Kwiatkowski
Letter 18-U.S. Environmental Protection Agency
Letter 19-Lewis and Clark County, Board of County Commissioners
Letter 20-Galusha, Higgins & Galusha - S. Clark Pyfer
Letter 21-U.S. Department of the Interior, Bureau of Mines
Letter 22-Ray H. Breuninger
Letter 23-Ronald E. Larsen
Letter 24-Beverly Beck Glueckert

Testimony 1--Walter Johnson
Testimony 2--Don Jenkins
Testimony 3--Bob Marks
Testimony 4--Russ Cravens
Testimony 5--Gene Donaldson
Testimony 6--Ray Breuninger

United States Department of the Interior

GEOLOGICAL SURVEY
Water Resources Division
Federal Building, Room 428
301 South Park Avenue, Drawer 10076
Helena, Montana 59626-0076

December 6, 1985



Mr. Kit Walther, Chief
Environmental Analysis Bureau
Montana Dept. of State Lands
Capitol Station
Helena, Montana 59620

Dear Mr. Walther:

Thank you for the opportunity to review the environmental impact statement for the Montana Tunnels mining project. We have examined sections of the report relating to both ground-water and surface-water hydrology. Our comments are attached. For additional information you can contact Bob Davis (449-5263) regarding ground-water comments and Roger Knapton (449-5496) regarding surface-water comments.

Sincerely,

for Ronald R. Ritchey

Joe A. Moreland
District Chief

Attachment

Ground-Water Review

A Page II-14, paragraph 3: Although the installation of recovery wells downgradient of the water retention pond is stated, the planned number and location of the wells and the constitutents to be included in analyses of water from the wells has not been specified. The recovery wells are the last line of defense and will be very important to controlling off-site impacts. Careful analysis should be made to determine well spacing, construction methods, withdrawal timing and rate, etc. Also the consequences of failure of the recovery well system should be addressed.

B Page II-32: Alternative 2, measure C deletes the need for a recovery well system if a polyethylene liner is used for the process-water retention pond. Although the liner may significantly reduce leakage, some leakage may still occur. Because monitoring of water in the tailings impoundment area may not detect leakage from the retention pond, installation and monitoring of the recovery well system as originally planned seems appropriate.

C Page IV-10, pargaraphs 3, 5, and 6: Because 14 gallons per minute may leak from the tailings impoundment and 20 gallons per minute may leak from the process-water retention pond and because the effectiveness of the recovery-well system may be limited, installation of monitoring wells downgradient of the recovery-well system seems appropriate.

D Page IV-11, paragraph 1 and Table IV-4: Although appendix 4 lists most of the process chemicals as toxic, no mention is made of including the process chemicals (other than cyanide) in analyses of water that may be leaking from the tailings impoundment and the retention pond. Because of the toxicity of these chemicals, their inclusion in analyses of water in and around the tailings impoundment and retention pond seems appropriate.

E Page IV-11, paragraph 4: Although leakage from the tailings impoundment would be to the unsaturated zone, the leakage would eventually reach the saturated ground-water system.

F Page IV-12, table IV-5: The table does not include process chemicals except for cyanide.

Surface-Water Review

G Page II-29: Although surface-water monitoring for flow and water quality are addressed, there is no defined plan as to where monitoring will be done, what water-quality parameters are to be examined, or what the frequency of sampling will be. As indicated, DSL will have to approve final design of the monitoring program. However, it may be desirable to be more specific in the EIS. There also should be concern as to who will carry out the monitoring--will it be the mining company or an independent investigator?

H Page III-11 and Table III-1: There seems to be no baseline information on suspended sediment or total suspended solids. Could this have been an oversight in the sampling program or is there data that have not been listed in Table III-11? Since sediment will be a major concern in mining and the processing of ores, it should not be overlooked in the monitoring program. Baseline sediment data could prove very useful in assessing future impacts to the stream from mining and associated activities.

A National, as well as State of Montana, Environmental Policy Act regulations and guidelines do not require that specifics of monitoring plans be addressed in environmental impact statements. Such a discussion would not add any substantive information to help the reader evaluate the potential environmental impacts of a proposed project. However, monitoring flow as well as ground and surface water quality, would be an integral part of the operation of the Montana Tunnels project. Before construction could begin, a monitoring plan must be approved by the Department of State Lands and the Department of Health. All agency suggestions and public comments would be taken into consideration during development of the operational water quality monitoring plan.

A worst-case analysis of the consequences of failure of the recovery well system would be the same as under Alternative 1. The data presented in table IV-5 predict impacts on water quality in Spring Creek under this alternative.

B Alternative 2, measure C indicates ground water quality would be monitored downgradient of the proposed tailings disposal area. In addition, the company has committed to retaining the recovery well/pump back system as originally proposed.

C Comment noted. See response A.

D Because of their relatively high toxicity, sodium cyanide and copper sulfate were chosen as indicator parameters in determining potential water quality impacts from the proposed project. The results of DSL's analysis for both total cyanide and copper are presented in table IV-5 of the draft EIS. From this analysis, it was determined that the seepage rate calculated for the proposed process water retention pond (Alternative 1) was cause for concern. Alternative 2, Measure C is DSL's response to this concern. This measure requests that the retention pond be redesigned in a manner which minimizes seepage. As such, analyzing the impact of other mineral processing chemicals is viewed as an academic exercise which would lead to the same result--namely, redesigning the process water retention pond to minimize seepage.

E The assertion that "leakage from the tailings impoundment would eventually reach the saturated ground water system" is unsubstantiated. The analysis performed by DSL indicates the small volume of seepage generated at the impoundment site would be held by negative pore pressures in the unsaturated zone. After reclamation, recharge to the underlying ground water system through the reclaimed tailings mass would also be effectively curtailed. DSL's analysis is based on a methodology documented on page 275 of Planning, Design and Analysis of Tailings Dams (Steven G. Vick, 1983).

F Comment noted. See response D.

G Comment noted. See response A.

H Total suspended solids (TSS) data were collected from 12 different surface water monitoring stations during the baseline period of measurement. Data from station SW-3 (Spring Creek 0.5 mile above Corbin) and station SW-16B (Clancy Creek at Kady Gulch) represent water quality from streams that could potentially be affected by the project. Concentrations of TSS ranged between less than 1 milligram per liter to 19 milligrams per liter in Spring Creek, and between 2 and 12 milligrams per liter in Clancy Creek.

DSL will consider monitoring surface water for changes in the concentration of TSS. In addition, the company has developed a proposal which commits to controlling drainage water and sediment discharges. This information is presented in Technical Support Appendix D.

ALLEN R. McKENZIE
ATTORNEY AT LAW
2821 EDWARDS STREET
BUTTE, MONTANA 59701
TELEPHONE: 406-494-2711

December 12, 1985

Mr. John Fitzpatrick
Centennial Minerals Inc.
Power Block Building
Helena, Montana

RECEIVED
DEC 13 1985
STATE LANDS

Re: Montana Tunnels Project
James K. Archibald

Dear Mr. Fitzpatrick:

I represent James K. Archibald of Butte, Montana who as the successor in interest of Edith Archibald is the owner of a residence located on the Deer Lode Extension, patent number 10332.

Mr. Archibald's title is based on a ninety-nine year lease which was executed in 1914 between The Blizzard Mining Company and Charles Whitmore. This lease is recorded in Book 44 of Deeds, page 382, records of Jefferson County, Montana. I should mention in passing that the validity of the lease has been recognized in title opinions by three different law firms, including the Butte firm of Corette Smith and Dean, which in a 1955 opinion confirmed the title of Edith Archibald. That opinion mentions the possible interest of C. S. Benoard in certain of the claims covered by the lease which are found to be subject to the rights of Edith Archibald under the ninety-nine year lease. This lease was also recognized in a law suit which I handled in Jefferson County District Court on behalf of L W & L Mining Company, Mrs. Archibald's assignee.

A In reviewing the Environmental Impact Statement issued by the Montana Department of State Lands it appears that access to the residence will be eliminated through closure of the county road which was dedicated December, 1910 by official action recorded in Book 5 page 591 records of Jefferson County, Montana. I see no comment in the E I S which relates to abandonment of this road by the County and certainly no notice to affected landowners appears of record to my knowledge.

A The mine plan indicates that 1-1/2 miles of the county road that provides access to Mr. Archibald's property and Pen Yan Creek will be covered by a waste rock dump. Only the county can close the road. The company will not petition for closure of the road (John Fitzpatrick, Manager of Administration, Centennial Minerals, written comm., December 13, 1985).

The company will petition the county to alter the location of the road to avoid the dump. The route that the company has committed to propose for relocation will provide access to Mr. Archibald's property and federal land beyond. The company will pay all road relocation costs.

B In addition to the clear violation of my client's property rights the proposed project would apparently create environmental conditions which would render the air quality at the residence unacceptable and as I view the report in excess of the Total Suspended Particulate Count (TSP) authorized under State regulations.

C Finally, it would appear that the power line providing electrical service to the residence would be eliminated by the proposed project.

In view of the foregoing I must advise that my client must resist the proposal as outlined in the draft E I S.

Very truly yours,

Allen R. McKenzie

cc: Mr. Kit Walther
Department of State Lands
Helena, Mt.

B Computer simulation modeling performed as part of the air quality permit application indicates that there will be no exceedances of state or federal ambient air quality standards at the residence. The predicted 24-hour maximum and annual average particulate concentrations are approximately 110 and 26 $\mu g/m^3$, respectively. These levels are well below the applicable standards (table III-11, DEIS). The residence is generally upwind of dust sources; however, under some conditions, dust may be carried to the area.

C If development of the waste rock dump requires that the existing power line be removed, the company will reroute the line around the dump to continue electrical service to Mr. Archibald's property. Any such rerouting will be paid for by the company (John S. Fitzpatrick, Manager of Administration, Centennial Minerals, Inc., written comm., December 13, 1985).

MONTANA CHAMBER OF COMMERCE
P.O. BOX 1730 • HELENA, MONTANA 59624 • (406) 442-2405

December 13, 1985

RECEIVED
DEC 16 1985
STATE LANDS

Mr. Kit Walther
Chief, Environmental Analysis Bureau
Montana Department of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. Walther:

This letter is written in support of the Montana Tunnels Project proposed by Centennial Minerals and the U.S. Minerals Exploration Company.

It is extremely important for the Department of State Lands to bear in mind that the people of the area have been very supportive of this project. The preponderance of concerns raised at a hearing held in Clancy on May 13 were favorable toward the project.

In considering the alternatives, DSL should also bear in mind the substantial investment already made in this project. A local representative of the project noted at a meeting of the Hard Rock Mining Board that the project had already been through more "administrative hoops" than he cared to think about.

Montana Tunnels has received more than 1,300 job applications without soliciting them. They have come from every county in Montana, from other states, and from Peru and Chile. This alone would indicate a need for a project of this type.

We believe Alternative 1 protects the environment while not imposing an unnecessary regulatory and financial burden on Centennial Minerals and the U.S. Minerals Exploration Company. The Montana Chamber would urge swift approval of Alternative 1, to speed the project and its investment in Montana.

Sincerely,

Forrest H. Boles
President

FHB/ssg

Comment noted, thank you.

# LETTER 4

This letter is a typed reproduction of a handwritten, signed letter that was received by the Department. The letter was typed for ease of reading after publication.

December 16, 1985

Regarding the Montana Tunnels Project--Draft Environmental Impact Statement re-open pit and mill near Jefferson City, MT.

I struggled through parts of the November 1985 draft and am not expert enough to give valid, specific comments, however, in my mind the project must be given the GO AHEAD. I am not sure what the best alternative might be where there are choices, but--

1. The project seems well planned
2. The ore is there
3. The money and backing seems there to make the project click
4. Montana needs to develop this mine and others and boost the economy when possible
5. It looks like the environment can stand it
6. My God, the State motto means gold and silver so lets help the project and not surpress it by excessive red tap.

Born in Klein and lived many years in Montana.

Charles Popovich

RECEIVED
DEC 20 1985
STATE LANDS

Comment noted, thank you.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Office of the
Regional Director

Region VIII
Federal Office Building
1961 Stout Street
Denver CO 80294

December 18, 1985

Mr. Kit Walther
Chief, Environmental Analysis Bureau
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

DEC 23 1985
STATE LANDS

Dear Mr. Walther:

We have reviewed the Draft Environmental Impact Statement for the Montana Tunnels mining project proposed by Centennial Minerals, Inc. and the U.S. Minerals Exploration Company.

We have concluded that this mining project will have no significant impact on human services in the affected area of Montana.

Elwyn Holtrop
Regional Special Programs Coordinator

Comment noted, thank you.

LETTER 6

IN REPLY REFER TO:

United States Department of the Interior

3809

BUREAU OF LAND MANAGEMENT
BUTTE DISTRICT OFFICE
P.O. Box 3388
Butte, Montana 59702-3388

RECEIVED
DEC 23 1985
STATE LANDS

DEC 20 1985

Mr. Kit Walther
Environmental Analysis Bureau
Montana Department of State Lands
1625 11th Ave.
Helena, Montana 59620

Dear Mr. Walther:

My staff has reviewed the Montana Tunnels Project Draft Environmental Impact Statement. We have the following comments:

A 1. Several people commented that this draft is one of the more easily readable and understandable Environmental documents they have read.

B 2. The draft does an excellent job of addressing impacts and identifying mitigating measures.

C 3. One easily corrected oversight would be to add the "U.S. Bureau of Land Management, Butte District Office," as an agency consulted in Chapter VIII.

This document will meet our requirements for compliance with NEPA and copies of the draft and final will be included in our files with a cover memo identifying them as our environmental documentation for NEPA.

Sincerely yours,

Jack A. McIntosh
District Manager

A Comment noted, thank you.

B Comment noted, thank you.

C Comment noted. The BLM was recognized in the section Agency Responsibilities, Chapter 1, and has been added to the list of agencies consulted.

We Mean Business!

HELENA AREA CHAMBER OF COMMERCE
201 East Lyndale Avenue
Helena, Montana 59601
406/442-4120





December 20, 1985

Mr. Dennis Hemmer, Commissioner
Department of State Lands
State of Montana
1625 Eleventh Avenue
Helena, MT 59620

Dear Dennis:

The purpose of this letter is to reaffirm the position of the Helena Area Chamber of Commerce regarding the Draft Environmental Impact Statement of the Montana Tunnels Project by Centennial Minerals.

Russ Cravens, the President of the Chamber, articulated our position in favor of the project during your December 18, 1985 hearing in Clancy.

You might also be interested in knowing that a 1984 survey by the U.S. Chamber of Commerce indicated that every 100 new manufacturing (including mining) jobs added 64 new nonmanufacturing jobs. By no stretch of the imagination, we know what the direct impact will be, but the secondary impact will also be major.

Again, Dennis, if there is anything we can do to facilitate this process, please feel free to call on us.

Sincerely,

Joseph N. Weggenman
Executive Director

Comment noted, thank you.

Have a Helena Day!

# LETTER 8

December 23. 1985

Mr Kit Walther, Chief
Environmental Analysis Bureau
Montana Department of State Lands
Capital Station
Helena, Montana 59620

RECEIVED.
DEC 27 1985
STATE LANDS

Dear Mr. Walther:

Thank you for the opportunity to comment on the draft environmental impact statement (EIS) for the Montana Tunnels mining project. I have two areas of concern.

A According to your document, 245 acres will be occupied by the proposed tailings impoundment. The tailings materials have a net acid-generating potential and would acidify applied topsoil if alternative #1 was implemented. Alternative #2, measure D, proposes to mitigate this impact by capping the tailings materials with 12 inches of innocuous waste rock. The EIS does not describe this measure in a way which explains to the reader how the cap will be constructed to prevent piping of the applied topsoil into the pore space of the cap. Once piping has occurred, corridors will be available for the upward diffusion of acidity, and long-term plant establishment on the tailings will be jeopardized. Should this occur, over 25 percent of the total proposed disturbance would become susceptible to wind and water erosion.

B A more detailed plan for tailings reclamation should be described in the EIS to ensure the public that adequate environmental protection will be provided for the post-mining landscape.

C My second concern is with the composition of the interim seed mixture. I assume from the species included in the "final" mixtures that plant community diversity is a revegetation goal. Diversity will be reduced when disturbed areas are seeded with highly competitive, perennial, introduced species such as crested wheatgrass and smooth brome. These species should be deleted from the interim mix to enhance more rapid establishment of a diverse, native plant cover.

Thanks again for the chance to comment.

Sincerely,
Tim Byron

A The potential for piping to occur in the waste rock material was investigated. The tailings cap would consist of innocuous volcanic materials. Blasting, removal, handling, redistribution, and grading of this volcanic material would result in a size fraction equivalent to a cobbly sandy loam. This texture is similar to the texture of the soils that would be salvaged and used for reclamation.

Most piping begins as a crack, either at the surface or at an interface between dissimilar soil layers or soils and waste material. Because of the texture and chemical characteristics of both the soils and the waste material, cracking (and, therefore, piping) is not expected to occur in these layers.

Piping is also not expected to be a problem at the interface between the waste rock material and the tailings, even though the two substrates differ considerably in texture. The tailings would be deposited by a method called subaerial deposition. Basically, this method involves the systematic deposition of tailings in thin layers and allows each layer to settle, drain, and partially dry before being covered by another layer. The concepts behind this method have been applied to over 40 tailings disposal facilities during the past 25 years in Great Britain, Central Africa, Australia, and most recently, Canada (Knight and Haile, 1983). Because of the nature of this deposition method, significant postmining differential settlement is not expected to occur over most of the tailings area; therefore, it is anticipated that cracking (and piping) would not become a widespread problem. The greatest amount of settlement and cracking would occur in a small area just upstream of the tailings embankment. This area would have the lowest surface elevation, but would have the greatest depth of tailings in the impoundment. Because this area would be a depression and would contain a high concentration of fines, it may take a few years for the tailings in this area to drain, dry, and settle. Until such time, this area would not be capped with waste rock or reclaimed. During this time interval before waste rock capping, it is expected that most of the major settlement and cracking would occur. No major cracking or piping problems are anticipated following final reclamation.

B The Department of State Lands feels that the reclamation plan is discussed in sufficient detail in the EIS for the public to make a determination regarding the adequacy of environmental protection offered by the applicant. (Please see chapter II, page II-21 to II-30.) If you feel you require more detailed information, the permit application is available for public review at the Department of State Lands' office and also at Centennial Minerals' office, both located in Helena.

C Your initial assumption is correct. The applicant's objectives for final reclamation include restoring rangeland and wildlife habitat and protecting water resources. Establishing a diverse plant cover would help to achieve these objectives. However, the goal of interim revegetation is to stabilize disturbed areas as quickly as possible. The rapidly developing, introduced species in the interim seed mixtures are, therefore, appropriate. Areas seeded with interim seed mixtures would be topsoiled and seeded (with species from tables II-7 and II-8) during final revegetation.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Ecological Services
Federal Building, Room 3035
316 North 26th Street
Billings, Montana 59101-1396

IN REPLY REFER TO:
ES
61410

December 26, 1985

RECEIVED
DEC 27 1985
STATE LANDS

Mr. Kit Walther, Chief Environmental Analysis Bureau
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

Dear Mr. Walther:

We have reviewed for compliance with federal fish and wildlife laws and policy the Draft Environmental Impact Statement for the Montana Tunnels project proposed by Centennial Minerals, Inc. and U.S. Minerals Exploration Company near Jefferson City, Montana.

We note that lands and minerals administered by the Bureau of Land Management are included within the permit area. Pursuant to Section 7 of the Endangered Species Act of 1973, as amended, the Bureau of Land Management must determine if the proposed development may affect endangered species that occur in the project area. The Final Environmental Impact Statement should reference the Bureau of Land Management's relevant assessment.

Sincerely,

John G. Wood
Field Supervisor
Ecological Services

cc: Director, Montana Department of Fish, Wildlife, and Parks, Helena, MT
District Manager, BLM, Butte, MT
Regional Director, USFWS, Denver, CO (HR-60120)
Field Supervisor, USFWS, Helena, MT (SE-61130)

The Bureau of Land Management supports the draft's conclusion of no effect on the threatened or endangered species (Jack A. MacIntosh, Butte District Manager, BLM, written comm., January 7, 1986).

December 29, 1985

RECEIVED
DEC 30 1985
STATE LANDS

Mr. Kit Walther, Chief,
Environmental Analysis Bureau
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

Dear Mr. Walther:

Below are our concerns on the Environmental Impact Statement for the Montana Tunnels Project. We are residents of Jefferson County residing across the road from the "Centennial Ranch".

A 1. How far would the cone of depression, caused by the pit, extend during operation of the mine? How much would it lower the water table of the area? What will monitoring wells and other mill operations do to the water table?

B 2. Would the polyethylene liner eliminate the possibility of seepage from the process water retention pond?

C 3. Since winter range is the major determining factor to the size of deer and elk herds what will happen to the 1500 deer and elk displaced? Is there enough quality range elsewhere?

D 4. The amount of traffic on the Corbin-Wickes road will increase 337.4% according to the EIS low prediction for the first year of operation. The local public should be given plans prior to the upgrading of this road and made aware of inevitable traffic problems that will be encountered. A construction timetable for this project should be included in the EIS to make certain that State Highway Department laws for tonnage requirements, speed limits, etc. are not broken by the Company.

E Thank you for the opportunity to comment on the Impacts of the proposed mine. We feel that if the permit must be issued it should be granted under Alternatives number 2 or 3.

Sincerely,

Steve Johnsen

Teri Johnsen

P.O. Box 154
Jefferson City, MT 59638
(406) 933-8452

# LETTER 10

A Page IV-4 of the DEIS states that "By the tenth year of mining, the effects of this drawdown cone could extend about one mile." This prediction is based on a worst-case analysis with the conservative assumptions of a homogeneous isotropic aquifer of uniform thickness and infinite aerial extent; radial inflow to the pit equal to 50 gallons per minute; average transmissivity equal to 500 gallons/day/foot; and storativity equal to 0.01.

By the tenth year of mining, the water table adjacent to the pit could be at the same elevation as the bottom of the pit (elevation 4,960). The effect of dewatering decreases dramatically as the distance from the pit increases. Between 5,000 and 6,000 linear feet, the water table level would reflect existing baseline conditions. The influence of monitoring wells or the recovery well/pump-back system would not significantly affect the water table outside the perimeter of the permit boundary. The proposed production wells associated with mill operations have been eliminated in Alternative 2, and replaced with a surface water supply from Spring Creek below Corbin (see Alternative 2, Measure B, page II-32 of the DEIS). Under this alternative, no water table impacts are predicted.

B No liner system can completely eliminate all seepage from a water-storage facility. However, there are many materials available and different engineering design features which could be incorporated to substantially reduce the rate of seepage to nominal (near zero) levels. One of these materials is HDPE. The intent of Alternative 2, Measure C is to specify a result (reduction in the rate of seepage), rather than a specific design (use of HDPE).

C The draft discusses the displacement of mule deer and elk by mining (page IV-24 to IV-26). Due to the lack of winter observations, impacts to wintering deer are not considered significant. Predicting the number of animals displaced is not possible. Deer and elk forced into the abundant, surrounding habitats would compete with resident animals. Competition is discussed on page IV-24, paragraph 2 of the draft.

D The Montana Department of Highways does not regulate or enforce tonnage requirements on county roads. Such regulations are established and enforced by the political subdivision owning the property--for example, the county, the U.S. Forest Service, or BLM.

There are no load limits established for the county road between Jefferson City and Wickes. However, when the road is upgraded it will be designed to accommodate tonnages hauled by company trucks (Jim McCauley, County Commissioner, Jefferson County, pers. comm., January 8, 1986).

The draft EIS contained the most detailed construction timetable available at the date of publication. The EIS is one method of informing the public of project impacts and timing. The county, company, and DSL have also held public meetings to educate citizens about the project, to review the hard-rock impact plan, to identify issues for the EIS, and to review the DEIS.

E Comment noted, thank you. Please see DSL's proposed course of action in the Notice of Adoption statement at the beginning of this document.

Forest Park Water Users Assoc.
Clancy, Montana 59634

December 27, 1985

Kit Walther, Project Director
Montana Tunnels Project EIS
Department of State Lands
1625 Eleventh Ave.
Helena, Montana 59620



Dear Mr. Walther;

The deadline for submission of written testimony regarding the draft EIS for the Montana Tunnels project is too close to allow for our organization to respond comprehensively to three concerns: 1) water quantities available for downstream & senior water rights holders in Prickley Pear Creek; 2) water quality in the entire Prickley Pear drainage as a result of mining activity; and 3) safeguards against downstream pollution resulting from somewhat experimental tailings and holding ponds.

These three issues greatly concern the residents of the subdivisions of Forest Park Estates, Blue Sky Heights, Gruber Estates, and Saddle Mountain, particularly since these subdivisions are not mentioned in the draft EIS and Mr. Ashenberg, project hydrologist acknowledged at the Public Hearing that he had not even been aware of their existence, hence he had not addresed possible effects of the mining operation upon them.

We would like to continue the discussion begun at the public hearing with Mr. Ashenberg and members of your project staff in order that our concerns may be addressed in the final EIS, certainly in operation of the mine. We are in general support of the project, as it may afford some economic benefit to Jefferson County and the State of Montana, but we do not wish to have our aquifer or our lifestyle degraded or eliminated. Please feel free to call me at 933-8425 to set a meeting time or to discuss our concerns.

Thank you for your interest.

Sincerely,

Richard Chess

Richard Chess, Chairman
Board of Directors
Forest Park Water Users Assoc.

cc: Directors
Dan Ashenberg, DNRC

RC/mn

As proposed under Alternative 1, the Montana Tunnels project could impact existing senior surface water users during periods of low flow. Please refer to the discussion on pages IV-8 to IV-10 of the draft EIS, and mitigations on pages II-32 through II-33. Under Alternatives 2 and 3, mitigations would require the company to purchase senior water rights, or develop additional storage.

Domestic uses of ground water from either fractured bedrock or alluvial wells in the vicinity of Forest Park Estates, Blue Sky Heights, Gruber Estates, or Saddle Mountain would not be affected by the proposed project, even during low-flow periods. Under worst-case conditions, the radius of influence of any production wells associated with Alternative 1 would never extend to the area the Forest Park Water Users Association would be concerned about. Under Alternatives 2 and 3, surface water diversions from the proposed project site would not dewater the aquifer from which members of the Association obtain potable water.

A discussion regarding the analysis of water quality in Spring Creek and Prickly Pear Creek can be found in the draft EIS, pages IV-4 through IV-14. In this analysis, DSL indicates that under Alternative 1, seepage from the proposed unlined process-water retention pond would be a serious environmental concern. To mitigate the potential for contamination of ground or surface water, Alternatives 2 and 3 require that the process-water retention pond be designed in a manner which reduces seepage to nominal (near-zero) levels.

Flow monitoring, as well as ground and surface water quality monitoring, will be an integral part of the operation of the Montana Tunnels project.

# LETTER 12

December 24, 1985

Janet Lyon
616 Clark
Billings, MT 59101

Kit Walther
Dept. of State Lands
Helena, MT 59620



Dear Kit:

I'm writing to comment on the information that was presented at the public hearing on the proposed pit mine in the Clancy area. I've had concerns for some time about the ability of the mining company to maintain water quality in the area. Apparently the testimony of Ray Breuninger substantiated these concerns in a capacity that I'm unable to do. He also raised the issue of the lack of monitoring plans/facilities for the project. I'm sure the seriousness of these issues is clear to you. I'm writing to inform you of these concerns and to request specific information from you or the appropriate specialists about how these issues will be addressed by Centennial Minerals.

I appreciated talking with you on the phone several weeks ago about your opinion of the ability of the specialists with DSL to maintain objectivity despite the economic "needs" of the state for a project like this. I have been made aware since then of political factors and a pro-mine attitude of Ted Schwinden that would clearly curtail that objectivity. I understand that you have little to do with this problem, but I think it's important that you and other key people with DSL know that the public may be wary of this potential problem when dealing with such a high-impact project.

I will appreciate hearing from you on the water quality and monitoring concerns as soon as possible. I trust that they will be addressed fully in the final environmental impact statement.

Sincerely,

Janet Lyon

Janet Lyon

cc: Ted Schwinden
Max Baucus

Please refer to the responses to letters 1, 19, and 23.

ALLEN R. McKENZIE
ATTORNEY AT LAW
2821 EDWARDS STREET
BUTTE, MONTANA 59701
494-2711
TELEPHONE: 406-

RECEIVED
DEC 30 1985
STATE LANDS

December 28, 1985

Commissioner Dennis Hemmer
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

Subject: Montana Tunnels Project
Environmental Impact Statement
James K. Archibald

Dear Sir:

In accordance with the review process prescribed I submit herewith on behalf of James K. Archibald, the owner of a residence located approximately 100 feet inside the proposed permit area, 3000 feet south of the proposed pit and 500 feet west of the proposed waste dump, the following comments:

A (1) The permit, if issued, should ensure the continued use and availability of the county road established in 1910 by official action recorded Book G page 591, records of Jefferson County, Montana. It appears from the draft Environmental Impact Statement that the waste dump will cover approximately 1¾ miles of the county access road from Wickes.

B (2) The permit, if issued, should provide for the continuation of the power line which provides electrical service to the residences in the area.

C (3) The permit, if issued, must address and protect the following environmental problems:

(a) Dust Impact

Being within 500 feet of the point where waste trucks are dumping will almost certainly cause situations where the TSP limit of 165 $ug/m^3$ is exceeded.

A The company does not intend to ask the county to abandon or restrict use of the county road which provides access to Mr. Archibald's property. See letter 2, answer A.

B The company will provide for continued electrical service to residences in the area. See letter 2, answer C.

C See letter 2, response B.

Page 2

D (b) Noise Impact
With haul trucks operating less than 500 feet from the residence, the ambient noise will be increased by some 30-40 decibels. Blasting will also be easily heard from the residence.

E (c) Visual Impact
The waste dump as well as increased smoke and dust will be visible from the residence.

Very truly yours,

Allen R. McKenzie

cc: Mr. Kit Walther

Mr. Terry Grotbo
Hard Rock Bureau Chief
Department of State Lands
Helena, Montana

D The ambient noise level in the vicinity of the proposed permit area is between 20 and 40 decibels (dB[A]). Since publication of the draft EIS, the applicant has changed its permit boundary and waste rock dump location in the vicinity of Mr. Archibald's residence. The residence is now outside of the permit boundary and about 1,200 feet from the closest point of the waste rock dump. The haul trucks, operating at the closest point to the residence, would increase the noise level to about 40 to 50 dB(A). This projection is based on a study of noise from ore trucks at Montana City (Montana Department of Highways, written comm., September 4, 1980). Most waste rock would be deposited in the dump at distances greater than 1,200 feet (up to 6,000 feet) from the residence, and the noise level would decrease correspondingly.

Probably the most noticeable noise that would be heard from the residence would be blasting. Noise levels from blasting would range between 70 and 100 dB(A). Noise from blasting would be brief, and would most likely occur one to four times per week. Blasting noise would be most noticeable when the pit is first opened, and would decrease as blasting occurred deeper in the pit. Noise levels within the ranges discussed above would not pose a health hazard for occupants of the residence.

E The company has redesigned its waste rock dump and moved the permit boundary away from Mr. Archibald's residence. These changes, in addition to the wooded nature of the topography surrounding the residence, will reduce visual impacts to the residence. See letter 2, response B for answers to your comment on smoke and dust.

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION

TED SCHWINDEN, GOVERNOR
1520 EAST SIXTH AVENUE
STATE OF MONTANA
DIRECTOR'S OFFICE (406) 444-6699
HELENA, MONTANA 59620

DEC 1985
STATE LANDS

MEMORANDUM

TO: Kit Walther, Environmental Analysis Bureau Chief
Department of State Lands

FROM: Carole I. Massman, Administrative Officer
Department of Natural Resources and Conservation

RE: Montana Tunnels Project

DATE: December 30, 1985

The Montana Department of Natural Resources and Conservation (DNRC) offers the following comments on the draft Environmental Impact Statement (DEIS) written on the referenced project.

A 1. Questions regarding the proposed one-mile transmission line from the plant to the 100-kV Helena-Butte line have been directed to DNRC. However, the Major Facility Siting Act covers only lines more than 10 miles long. Therefore, DNRC has no review authority over this aspect of the project.

B 2. As the DEIS points out, surface water available for the project will be limited because of senior water rights downstream. We suggest that the Department of State Lands consider cautioning readers that the results of the surface water availability analysis summarized in Table IV-2 are based on gaging records at a station many miles downstream of the mining area and do not reflect the volume of unappropriated surface water available for use at the proposed mine. DNRC's Helena Water Rights Field Office will utilize the results of these analyses as well as its own analysis to decide on the issuance of a water use permit for the mining companies, when an application is received.

CENTRALIZED SERVICES DIVISION (406) 444-6700
CONSERVATION DISTRICTS DIVISION (406) 444-6667
ENERGY DIVISION (406) 444-6697
OIL AND GAS DIVISION (406) 444-6675
WATER RESOURCES DIVISION (406) 444-6591

A Comment noted, thank you. Please refer to Agency Responsibilities, Chapter 1 of the DEIS.

B Please note that table IV-2 of the DEIS is titled "Water Availability Analysis for Prickly Pear Creek Near East Helena." (Emphasis added.) Nowhere does the text state that this analysis provides an estimate of the volume of unappropriated surface water available for use at the proposed mine. The concern here is the difference between the quantity of water needed to satisfy senior appropriators downstream of the USGS gaging station and the seasonal availability of flow at this point in the stream. Since late-season irrigation shortages are a common occurrence, Alternative 2, Measure A was suggested to mitigate potential water rights conflicts.

The following water rights applications were received by the Department of Natural Resources and Conservation before August of 1985:

59099-41I - 600 (ground water wells)
59100-41I - 600 (Washington Mine)
59101-41I - 600 (Spring Creek)
59102-41I - 600 (Minah Mine)
59235-41I - 600 (ground water pit)

59236-41I - 600 (unnamed tributary to Spring Creek)
59237-41I - 600 (unnamed tributary to Spring Creek)
38508-41I - 600 (Homestake Creek)
00009-41I - 600 (Spring Creek)

Public notice pursuant to section 85-2-307, MCA, was given to water users in September 1985 and objections were filed.

DNRC reviewers felt that this DEIS in general is well done, and it appears to cover all the issues. We appreciate the opportunity to review and comment.

CM/da
cc: Rich Brasch
Wayne Wetzel
Pete Husby

Montana Department
of
Fish, Wildlife & Parks

December 20, 1985

RECEIVED
DEC 30 1985
STATE LANDS

Mr. Kit Walther
Montana Department of State Lands
1625 Eleventh Avenue
Helena, MT 59620

Dear Mr. Walther:

We would like to compliment the Department of State Lands on a well prepared Environmental Impact Statement for the Montana Tunnels Project. We concur with the Department that alternatives 2 and 3 are preferable to alternative 1. Our concerns focus primarily on long term problems associated with the tailings impoundment and with seepage from the open pit once it has filled with water.

A II-9. While it is acknowledged that seepage discharge will be minimized, we assume that some seepage will occur through the clay liner. We are aware of the tailings dike instability problems associated with seepage and formation of toe ponds at the ASARCO-Troy facility. We are hopeful that Montana Tunnels structure will be engineered to prevent similar problems from occurring.

B II-10. As you know, wind blown tailings have been a problem at the ASARCO-Troy facility. Because of the above, it may be advisable to require Montana Tunnels to install a sprinkler system at the onset of mining.

C II-14. The capacity of the seepage retention pond is not clearly outlined in the text. We would recommend that at a minimum, that the retention pond be engineered to withstand a 24-hour, 100-year storm event.

D II-22. As pointed out in the text, one of the primary waste rocks generated, sub-ore grade diatreme material (accounting for about 25% of the waste rock generated) has the net potential to generate acid. We are concerned that Pen Yan and Homestake Creeks, which will be routed through the waste rock, will become acidic, and hence contribute to acid drainage in Prickly Pear Creek. Even if the Creek channels are lined with non-acid-producing waste materials, we are concerned that precipitation falling on sub-ore grade diatreme could result in acidification of the drainage.

E II-27. It is unclear to us how water collecting in the seepage pond will be handled once mining is completed. We are concerned that overflow could occur once consumptive uses of water in the mill have been eliminated.

A A discussion regarding the rates of seepage calculated for the Montana Tunnels project can be found on pages IV-10 to IV-11 of the DEIS. Note that engineering design features of the Montana Tunnels project are quite different than those found at ASARCO-Troy. You should also be aware that studies by DSL and the U.S. Bureau of Mines have shown that the ASARCO tailings facility does not have instability problems. Please refer to pages II-9 to II-11 for details related to tailings dam construction and water management at the Montana Tunnels tailings disposal facility.

B A potential for wind-blown tailings has been identified as a concern with this project. The Montana Tunnels tailings impoundment would be similar to the ASARCO-Troy facility in that there would be a large exposed tailings surface subject to wind erosion. The major difference is the tailings deposition technique. With Centennial's sub-aerial technique, tailings would be deposited from distribution mains around the upstream perimeter of the impoundment, in thin layers, in a controlled rotational sequence. The frequency of rotation would be about six days. The company would have the flexibility to increase the frequency of the tailings rotation or discharge from the entire perimeter to maximize surface moisture and avoid dusting. The impoundment of ASARCO-Troy is divided into four quadrants with active tailings deposition taking place in one quadrant at a time for up to a few months. Because the other quadrants do not have tailings deposited for many months at a time, it was necessary to install sprinklers to wet the surface in the inactive quadrants.

If the rotational sequence of tailings deposition at Montana Tunnels does not adequately provide a moist surface to prevent wind erosion, a sprinkler system or equivalent mitigating measures would be required. This would be determined by the Air Quality Bureau based on site inspections and air quality monitoring results.

C Please refer to page II-14 of the DEIS for a discussion regarding the storage capacity of the process water retention pond under Alternative 1. A plan view of the proposed pond is shown in scale on page II-5, figure II-2.

The retention pond under Alternative 1 has been tentatively sized at 250 acre-feet with approximate dimensions of 400 ft. x 1,000 ft., averaging 30 ft. deep.

The runoff from the tailings facility for a 100-year, 24-hour storm event has been estimated at 81 acre-feet at year 10 of operation. Sufficient capacity would be maintained at all times for this runoff, leaving a usable storage capacity of 169 acre-feet.

The amount of water stored in the pond would vary throughout the year. A likely scenario would be storage of up to 169 acre-feet at the end of June each year, with gradual use of this water as make-up until maximum drawdown immediately before spring runoff. The actual quantity used as make-up would depend on the operation of other make-up water sources.

In practice, a certain minimum storage volume would be required to operate the recycle pumps. Depending on the final design of the pump station, and configuration of the retention pond, this could be as little as 2 acre-feet.

D During the life of the operation, all water that enters the channels would be routed into the tailings impoundment and recycled. During reclamation, the applicant has committed to covering the waste rock dump surface with the innocuous Lowland Creek or Elkhorn Mountain volcanic material, prior to soil replacement. Therefore, after reclamation has been completed, runoff water entering the channels would not be acidified or otherwise contaminated as a result of surface contact with the sub-ore grade diatreme material.

Precipitation that infiltrates and percolates through the dump could come in contact with the sub-ore grade diatreme material. However, acidification of Pen Yan and Homestake Creeks as a result of percolation water from the dump is not expected to occur for the following reasons:

1) Precipitation in the project area is about 15 inches per year. An estimated recharge rate would be about 1.5 inches or less, which is low.
2) Although 25 percent (by volume) of the waste rock material has a net acid-producing potential, the remaining 75 percent has a net neutralization potential.
3) The recharge would have to move through about 200 feet of unsaturated material.
4) There isn't enough percolation through existing, unreclaimed waste rock dumps in the area for seeps to occur. For example, an unreclaimed, uncapped waste rock dump exists at the nearby Bertha Mine, which has been abandoned for several decades. The material in the dump is acid-producing. However, the dump does not contribute to acid drainage in the area.

E Prior to the termination of mining and milling activities, a larger percentage of mill make-up water would come from the process water retention pond rather than from a fresh water source. At mine closure, the available storage would then be minimized. Full consolidation of the tailings mass would occur approximately five years later. During this time, a small amount of drainage

F II-36. The report indicates that a dry tailings disposal method offers no advantage over the proposed method. In our view, dry tailings disposal with progressive reclamation offers several significant advantages over the proposed system. These include: (1) less potential for seepage and contamination of both ground and surface water during mining; (2) smaller surface area exposed to wind erosion at any given time; (3) reduced chance of slumping and water contamination during the final reclamation phases; (4) smaller pond capacity; (5) decreased chances of impoundment failure; and (6) elimination of the need for recovery wells that according to this report have questionable effectiveness.

In our view dry tailings disposal is a superior option and should be considered.

G II-31-33. We support all of the mitigating measures proposed under alternative 2.

H IV-5. We understand the difficulties involved in predicting long range changes in water quality of Spring Creek associated with filling of the pit. Nevertheless, this is a major concern of ours. The conclusion that the pit will not overflow is based on the assumption that evaporation and in seep will exceed precipitation and out seep. However, it is not clear to us what information is available to support this assumption. We are aware that overflow occurred in a mine pond located only a few miles away in the Elkhorn Mountains. We are therefore uneasy over this prediction.

I IV-5. We would like to know what data was used to predict that only 15 gpm will seep out of the pond toward Spring Creek and what impact seepage from the pit will have on the rate of movement of the contaminated groundwater plume underlying Pen Yan Creek. Conceivably the increased hydrostatic head caused by the pit could accelerate the movement of contaminated groundwater toward Spring Creek.

J IV-10. We are particularly concerned over the uncertainty expressed as to whether the bentonite liner in the tailings impoundment will be subject to attack from caustic solutions. Should the above occur, it is our understanding that seepage will be greatly enhanced. Given the extremely high levels of cadmium, lead and zinc in water from the sulfide milling circuit, we are fearful that the metals load to Prickly Pear Creek could increase substantially. Particularly in view of the prediction (p. IV-10) that the effectiveness of the recovery wells is questionable given the geology of the project area.

K IV-11. Predicted concentrations of metals in tailings effluent appear low compared to earlier projections. How were these numbers derived and what assumptions were used?

into the process water retention pond would take place. Assuming the volume of waste water is minimal, it could be left in the pond to evaporate. If not, waste water could be pumped from the pond to the open pit. Bond on the process water retention pond would be released after drainage has ceased and the empty pond has been successfully reclaimed.

F A dry tailings disposal system is not a superior option to the proposed method if the following are considered:

1) Although seepage may be lower (depending on actual design) with dry-filtered tailings disposal, in both cases ground water would not be contaminated because of the storage capacity of the underlying unsaturated alluvium.
2) Operation of the proposed disposal system would keep the tailings moist most of the time. Thus, blowing tailings should not be a problem although the exposed surface area at any given time would be greater than with the dry tailings disposal method. In addition, other dust-control methods, including sprinklers, would be used to reduce wind erosion potential.
3) Slumping may actually be more of a problem with the dry-filtered tailings disposal method than with the method proposed by the applicant. Slumping and water contamination are not expected to occur with the proposed system of disposal.
4) Both systems would require about the same amount of acreage.
5) In both cases, the final disposal system would achieve a stable, dry-tailings mass. The proposed disposal system may be more stable than a dry-filtered tailings disposal system because tailings would be deposited behind a rock filled embankment.
6) The recovery wells are an engineering design feature of this facility that can be regarded simply as a "last line of defense" in protecting ground water quality should all other safeguards fail. In this respect, the function of the wells can be compared to the function of the second liner in a double-lined impoundment.

G Comment noted, thank you. See the Notice of Adoption statement at the beginning of this document for the DSL's proposed coarse of action and preferred alternative.

H The conclusion that the pit would not overflow is based on the results of extensive computer modeling efforts by the Department of State Lands. Modeling of the 45,000-acre-foot capacity open pit was based on a mass-balance approach which took into consideration such variables as precipitation, evaporation, overland flow, ground water inflow, transmissivity, storativity and time. The results of this analysis are presented in figure IV-2, thoroughly discussed on pages IV-4 to IV-8, and portrayed graphically in figure IV-1. The computer-generated output from this analysis is available for review at the Department of State Lands, Environmental Analysis Bureau.

I Four hundred and eighty years after mining ceases, inflow of water to the pit would equal outflow, establishing an equilibrium that would maintain a fairly constant water level. This situation is depicted in figure IV-1(c) of the draft EIS. A static flow analysis using Darcy's law was performed to quantify the flow moving out of a perpendicular cross section (A) of the pit. The cross section was assumed to be trapezoidal in shape with a = 3,000 feet, b = 1,500 feet and a height of 611 feet. Baseline permeabilities and hydraulic gradients were assumed, where K = 1.97 E-5 feet/minute and I = .07. Flow (Q) would then equal KIA, or about 15 gallons per minute.

For the next 480 years, a hydraulic gradient would be established which favors the movement of water in the project area toward the open pit (see figure IV-1[b] and response A to letter 11). Although the aerial extent of the existing plume is presently unknown, it could be anticipated that ground water within the radius of influence of the cone of depression caused by the pit would move toward the pit. The existing contaminant plume outside the influence of the cone of depression would continue moving downgradient toward Spring Creek at a rate no different than baseline conditions.

J Comment noted. Permeability testing with actual tailings effluent would be performed prior to final design.

K The predicted concentration of cadmium in the tailings effluent is lower compared with earlier projections. The reason for this is that supergene enrichment biased the surface bulk sample regarding soluble cadmium. The deposit below this zone contains little or no soluble cadmium.

The sample drill cuttings tested in the pilot mill were analyzed for cadmium using the same technique as the whole rock analysis of the bulk sample submitted to DSL on March 7, 1985. The results were as follows:

| Drill Hole | Depth (ft) | % Cadmium | % Zinc |
|---|---|---|---|
| C84RH055 | 85 -95 | 0.002 | 0.62 |
| C84RH058 | 145-155 | 0.002 | 0.70 |
| C84RH050 | 205-215 | 0.002 | 0.68 |
| C84RH061 | 225-235 | 0.002 | 0.62 |
| C84RH057 | 295-305 | 0.002 | 0.89 |
| C84RH050 | 355-365 | 0.002 | 0.68 |
| C84RH056 | 655-665 | 0.003 | 0.97 |

The percentage of zinc was previously available from the original drill assays and was performed by Bondar Clegg laboratories using atomic absorption methods. The average zinc grade of the ore body is approximately 0.7 percent and drill cuttings are representative of the deposit in depth.

The cadmium assays in the tailings water were reassayed by atomic absorption using a graphite furnace and the results are as follows:

| | | Water analysis, Cd (mg/l dissolved) | |
|---|---|---|---|
| Drill Hole | Depth (ft) | Bulk Tailings | Sulfide Tailings |
| C84RH055 | 85 - 95 | 0.0008 | 0.0001 |
| C84RH058 | 145-155 | 0.0007 | 0.0005 |
| C84RH050 | 205-215 | 0.0008 | 0.0003 |
| C84RH061 | 225-235 | <0.0001 | 0.0003 |
| C84RH057 | 295-305 | <0.0001 | 0.0003 |
| C84RH050 | 355-365 | <0.0001 | 0.0004 |
| C84RH056 | 655-665 | <0.0001 | 0.0003 |

L IV-17. The discussion of potential for acidification of soil used to cover the tailings impoundment suggests that it would be desirable to require capping of the tailings in a manner similar to that proposed at Jardine. Long term impacts of acidified top soils on soil erosion and plant growth have implications to contamination of surface waters and possibly to big game animals that graze in the area. We would prefer to see planning that eliminates these possibilities from the onset.

M Appendix 4. The potential for photodegradation of ferro- and ferric cyanide to form free cyanide are correctly described in the Appendix. Historic acid drainage from Corbin Creek into Spring and Prickly Pear Creeks makes these drainages particularly vulnerable to cyanide because acid water favor the formation of hydrocyanic acid -- the most toxic form of cyanide. Given that cyanide seepage into Spring Creek is predicted, it would be advisable to estimate concentrations of hydrocyanic acid in both Spring and Prickly Pear Creek and to assess the toxicological implications.

Sincerely,

Glenn R. Phillips
Pollution Control Supervisor
Room A206, Cogswell Building
Helena, Montana 59620

GRP/vb-41a

L We agree. Note that DSL's preferred alternative would require the applicant to either cap the tailings or propose other methods, subject to DSL approval, to prevent soil acidification and contamination (see page II-31 to II-34 of the draft EIS). Please see DSL's proposed course of action at the beginning of this document.

M Seepage of process water from the retention pond was predicted to be about 20 gallons per minute under Alternative 1. Table IV-5 presents a worst-case analysis of seepage impacts from Alternative 1, the company's proposal, on Spring Creek. From this analysis, it was determined that the seepage rate calculated for the proposed process water retention pond was cause for concern. Alternative 2, Measure C is DSL's response to this concern. This measure requests that the retention pond be redesigned in a manner which minimizes seepage. As such, analyzing the impact of hydrocyanic acid on Spring Creek and Prickly Pear Creek is viewed as an academic exercise which would lead to the same result--namely, redesigning the process water retention pond to minimize seepage.

LETTER 16

**Montana Department of Fish, Wildlife & Parks**

1420 East Sixth Avenue
Helena, Montana 59620



December 30, 1985

Mr. Kit Walther
Montana Department of State Lands
1625 Eleventh Avenue
Helena, Montana 59620

Dear Kit:

The following comments on the Montana Tunnels Project EIS are in addition to those recently forwarded to you by Glenn Phillips. In general, the format and content of the document are excellent; however, we have several comments relative to wildlife and fishery impacts of the proposed project.

A The mine permit area is adjacent to and partially includes an elk winter range. We are concerned that activities associated with the mine may cause shifts in wintering elk to other portions of the winter range where we are now experiencing elk damage complaints from private landowners. Should these problems increase in the future as a result of mine activity, the company should consider participating in designing a solution to protect the private property being impacted.

B In the upper Clancy Creek drainage, there will be an estimated 90 gallon per minute (0.20 cfs) loss from the stream to the open pit. Figure II-2 shows the pit extending to within 50 vertical feet and 700 horizontal feet of the stream. Given the amount of blasting, it seems possible that these calculations might be conservative. Upper Clancy Creek was estimated to have an average flow of only 2.1 cfs (III-11), but it supports a cutthroat trout population. Assuming the water loss calculations to be correct, the proposed 10% reduction in streamflow on such a small stream could have a significant impact on that trout population. The conclusion drawn (IV-13) appears a bit optimistic.

C Other water quantity questions arise on the main Prickly Pear Creek. The text states, "Prickly Pear Creek is an overappropriated stream that becomes completely dewatered below East Helena (III-11). The added water withdrawl caused by this project is projected to reduce streamflow at Jefferson City by

A Comment noted, thank you. If significant increases in elk damage complaints can be related to mining activity, the applicant would be advised to participate in developing a solution.

B The predicted loss of 90 gallons per minute is the result of a reasonable worst-case analysis using a methodology similar to the one referenced in the response to Letter 16, comment I. In this analysis, it is assumed that: Clancy Creek acts as a constant head recharge source for ground water flow to the mine pit; that the bedrock hydraulic conductivity equals $10^{-5}$ cm/sec or 0.028 feet/day; and that 6,000 linear feet of creek are affected. With the assumptions as stated, it is the contention of DSL that the results of the analysis presented in the DEIS are far from conservative. Furthermore, 90 gallons per minute is the maximum seepage rate. A rate this high would only be expected during the tenth year of mining when the head differential between Clancy Creek and the bottom of the pit is the greatest. After mining, the pit would begin filling with water and the head differential and rate of seepage would be expected to decrease. Please also note that page IV-5 of the DEIS states:

> The low rate of seepage is supported by the fact that the perimeter of the pit would not intercept Clancy Creek alluvium (Alan Richardson, Vice President of Operations, Centennial Minerals, Inc., pers. comm., February 1985). Furthermore, the applicant has committed to grouting and sealing fractures that might otherwise provide a conduit for larger quantities of flow from Clancy Creek.

The Department has considered your opinion regarding impacts to trout. However, the Department feels that the slight decrease flow (which would occur only under worst-case conditions) would not reduce habitat enough to cause a significant population decline.

35% while still affecting the stream by 10% at the USGS gage site (IV-9). Severe shortages occur in this reach during July and August at the present time. This added dewatering will negatively impact fish populations in Prickly Pear Creek (IX/ summary). This stream is already far below desirable mid-summer levels (unpublished F&G Data, 1978).

With 192 water users senior to Centennial Minerals, there appears to be a substantial conflict. In attempting to better understand the water shortage, it would be worthwhile to have a description of where in the Prickly Pear drainage the existing use is occurring. Consideration should be given to some type of water transfer arrangement in the lower drainage via the Helena Valley irrigation system.

Thank you for the opportunity to comment.

Sincerely,

Robert R. Martinka
Resource Assessment

RRM/bfs

cc: LeRoy Ellig
Dan Vincent

C The majority of senior water rights holders divert water from Township 10 North, Range 3 West, Section 25, Lewis and Clark County. A computer-generated summary of water appropriations data on Prickly Pear Creek is available for review at DSL or DNRC. In addition, a reference document titled Water Resources Survey for Lewis and Clark County contains maps which may be useful in identifying points of diversion, canal systems, and irrigated acreage.

A water right transfer arrangement would be considered by the company if it were deemed feasible and appropriate.

DSL has considered your opinion regarding impacts to trout. The only significant fishery in Prickly Pear Creek lies between East Helena and a point 3 miles below Spring Creek (Streamworks, 1984). The gauging station is located near the middle of this stream section. DSL believes that, despite small reductions in flow, fish populations during mining would be comparable to baseline populations.

IN REPLY REFER TO:
1797 (930)

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
222 North 32nd Street
P.O. Box 36800
Billings, Montana 59107

December 30, 1985

Kit Walther, Chief
Environmental Analysis Bureau
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

Dear Mr. Walther:

We have reviewed the draft Environmental Impact Statement (EIS) for the Montana Tunnels mining project. We found the document to be well written.

There was a question raised as to whether one exposure of bentonite, which is only 6 to 12 inches thick over a limited area (page III-4), was to be the only source of bentonite sealing material for the tailings pond which will have an area of 245 acres (page II-2).

Thank you for the opportunity to provide comments on this draft.

Sincerely,

John A. Kwiatkowski
Deputy State Director, Division
of Lands and Renewable Resources

cc:
Supv. Land Use Specialist,
Butte District Office

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The thin bentonite layer is described only to help characterize the foundation material of the proposed waste rock dump. The applicant has not proposed use of this bentonite layer as a source of bentonite sealer for the tailings disposal facility.

United States Environmental Protection Agency
Region 8, Montana Office
Federal Building
301 S. Park, Drawer 10096
Helena, Montana 59626-0096

EPA

REF: 8MO

December 30, 1985

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DEC 31 1985
STATE LANDS

Mr. Kit Walther, Chief
Environmental Analysis Bureau
Montana Department of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. Walther:

Thank you for the opportunity to review your agency's draft Environmental Impact Statement (EIS) for the Montana Tunnels Project. EPA comments are as follows:

A 1. We believe the applicant should be required to accept alternatives 2 or 3, the preferred alternatives as a condition for undertaking mining. This appears to be a reasonable requirement and one that offers protection to the environment. Also, the Draft EIS does not provide information indicating that alternatives 2 and 3 are infeasible.

B 2. We believe that the applicant should minimize release of dust to the air during construction. This will require watering or other supression approaches during construction of roads/mine facilities.

C 3. We believe that the applicant should provide adequate bonding/company commitments which are enforceable to correct soil acidification and other environmental problems that may not appear for years/decades after the mining has ceased. As the Draft EIS indicates, problems may not appear until many years after initial restoration attempts by the company.

D 4. We believe the State of Montana should require monitoring during and following mining to determine if seepage becomes an environmental concern in the unsaturated alluvium beneath the tailings impoundment and process water retention pond. The company may be required to establish a "sinking fund" to pay for monitoring/corrective action many years after mining has halted. The Federal/State of Montana hazardous wastes regulations require long term monitoring/corrective action.

E 5. It is implied by Table IV - 5, on page IV - 12 that the development of the mine will increase levels of heavy metals in Spring Creek. We do not understand how Montana's Nondegradation Rules (ARM Title 16, Chapter 20, Sub-Chapter 7) could allow a detectable increase in toxic contaminants to Spring Creek?

F 6. On page III - 13 it is stated that Spring Creek above Corbin is classified B - 1 according to Montana Water Quality Standards. In fact, our understanding of Montana Water Quality Standards it that Spring Creek is classified B - 1 for its entire length.

A DSL's proposed course of action is described in the Notice of Adoption of the draft EIS at the beginning of this document.

B The applicant has committed to minimizing construction-related emissions in its air quality permit application. This includes watering of haul roads and work areas, minimizing fall distances in material handling/excavation work, and promptly revegetating where possible.

With respect to road dust emissions during construction and operation, the control requirements have been clarified since issuance of the draft EIS. The portion of the access road relocated south of Corbin and the portion immediately west of Jefferson City must be chemically stabilized. The necessity for chemical stabilization on the remainder of the access road or portions of it will be determined by the Air Quality Bureau through on-site inspections.

C Under DSL's preferred alternative, the applicant would be required to either cap the tailings or propose other methods, subject to DSL approval, to prevent soil acidification and contamination. (Please see DSL's proposed course of action at the beginning of this document.) The reclamation bond will include the cost to cap the tailings with waste rock.

D Comment noted. Please refer to the response to letter 1, comment A.

Your comment regarding a "sinking fund" is noted. Presently, however, virtually all mining wastes are exempt from regulation as hazardous wastes.

E Table IV-5, page IV-12 of the DEIS predicts the impact of Alternative 1 on water quality in Spring Creek. Alternatives 2 and 3 mitigate water quality impacts by redesigning the process water retention pond to minimize seepage. Ground and surface water quality will be monitored to insure that the project meets the requirements of ARM Title 16, Chapter 20, Sub-Chapter 7.

F DSL recognizes that the entire length of Spring Creek is classified B-1. However, the water quality in Spring Creek below Corbin does not, in fact, actually measure up to B-1 clarification.

G 7. This project may have the potential to improve Prickly Pear Creek water quality by reducing Spring Creek flows (particularly if mitigating measure B is included). The EPA Las Vegas Research Lab studies on Prickly Pear Creek from 1980 - 1983 demonstrated that macroinvertebrate and periphyton diversity and total population were severely reduced by Spring Creek flows to Prickly Pear Creek, we would assume a reduction in these flows, would reduce contaminant transport to Prickly Pear Creek. These reduced Spring Creek flows, however, would only be temporary while the mine was operating (10 - 12 years). We're not sure anybody can predict what the long term impacts will be, particularly when the project is going to leave a 100 acre (+), 600 feet deep pit. There are also quantiti es of metals tied up in Prickly Pear Creek sediments. It is possible that a reduction in Spring Creek flows would not result in a meaningful improvement to Prickly Pear Creek if mobilization of metals from these sediments occurs.

H 8. Most project proposals of this routine indicate a specific water and aquatics monitoring program, including locations, parameters, and frequency. This EIS simply states on PP II - 29 and II - 30 that surface and ground water flow and quality will be measured during the life of the project. The report states (p. II - 30) that "Final design of both operational and if necessary, past mining water monitoring programs would be approved by DSL before project construction begins", more specifics of the proposed monitoring program should be included in the EIS.

We have found the draft EIS to be most informative. We hope our comments can help in your deliberations on the permitting of this project. If you have any questions please give me a call.

Sincerely,

John F. Wardell, Director
Montana Office

G Comments noted. DSL concurs with these observations.

H Comment noted. Please refer to the response to letter 1, comment A.

LETTER 19

City County Building
P.O. Box 1724
316 North Park
Helena, Montana 59624
Telephone 406/443-1010

# LEWIS AND CLARK COUNTY

Board of County Commissioners

File: 2404 MtTunnels.EIS
December 30, 1985

RECEIVED
DEC 31 1985
STATE LANDS

Mr. Kit Walther, Chief
Environmental Analysis Bureau
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

Dear Mr. Walther:

On behalf of the Lewis and Clark County Commissioners, I am responding to the Montana Tunnels Environmental Impact Statement. From Lewis and Clark County's perspective, the following items have not been satisfactorily addressed:

A I. Hydrology

1. Spring Creek provides water flow for Prickly Pear Creek. The EIS states that "depletion of flow in Spring Creek would diminish the flow of Prickly Pear Creek and potentially affect downstream senior appropriators during periods of low flow." How much of a reduction in Prickly Pear Creek water flows can be expected?

Alternative #2 states that the "applicant would design the process-water retention pond with sufficient storage capacity to operate during extreme drought conditions, or would purchase downstream senior water rights. During low-flow periods, this mitigation would protect water users downstream who have water rights pre-dating those of the applicant."

B **Alternative #2 appears to be the better option** for the 192 senior water rights holders (out of 218 water rights claims) on Prickly Pear Creek.

2. The EIS states that "seepage through the process water retention pond is considered significant and may cause an increase in the concentration of arsenic and total cyanide reaching Spring Creek for a period of 5-10 years." As stated previously, Spring Creek provides water flow for Prickly Pear Creek. As a result of this significant seepage, what levels of arsenic and cyanide concentration could be expected to occur in Prickly Pear Creek?

Alternative #2 states that the "applicant would line the process-water retention pond with an 80-mil, high-density, polyethylene liner. This mitigation would reduce seepage through the retention pond by about three orders of magnitude and would decrease the potential for water quality impacts."

**Alternative #2 appears to be the better option** when considering the

A Page IV-8 of the draft EIS states:

Depletion of flow in Spring Creek is not expected to further degrade water quality in Prickly Pear Creek during base-flow conditions. During an average year, the base flow of Prickly Pear Creek near Jefferson City could be reduced about 35 percent. Downstream, at the USGS gauging station, baseflow could be reduced about 10 percent. During spring runoff, impacts to Prickly Pear Creek would not be significantly different than baseline conditions. The most conspicuous problems would continue to be associated with existing mines and disturbances.

DSL agrees that Alternatives 2 and 3 would help mitigate impacts to existing downstream senior appropriators.

B Please refer to the responses to letter 1, comment A and letter 16, comment M.

DSL agrees that redesigning the process water retention pond to eliminate seepage would help mitigate the potential effects on the public's health, safety, and general welfare.

potential effects on the public's health, safety, and general welfare.

C 3. As a general comment: When considering all of the various mitigating effects that are presented for Alternative #2 (compared to the applicant's proposal), Alternative #2 appears to be a more environmentally sound option. Why is Alternatve #2 not the applicant's proposal? Why is the Montana Department of State Lands not requiring that the applicant comply with the requirements outlined in Alternative #2?

II. Sociology

D 1. According to the EIS, "between 36 and 81 families (containing an average of 3 people per family) would migrate into Lewis and Clark County during the first 3 years of mine construction. As the mine becomes fully operational (1990), about 17 to 32 more families would move into Lewis and Clark County, for a total of 43 to 113 new households over the life of the mine."

On the other hand, the EIS states that "about 84 people (28 families) are projected to move into Jefferson County in the first 3 years with 39 people moving in by 1990, when the mine becomes fully operational."

The EIS states that "in the Lewis and Clark study area, 16-36 in-migrant students would enroll in grades K through 8, and 8-18 students would enroll in high school during mine construction [total: 24-54 students]. During operation, 9-16 more mine related students would enroll in grades K-8 and enrollment in the high schools would increase by 5-8 students" [total: 15-24 students; grand total: 39-78 students].

According to the EIS, Jefferson County could expect an "increase by about 12 students in grades K-8 and 6 students at the high school level during construction. In 1990, enrollment is expected to increase by 7 students for grades K-8 and 3 students in high school." [grand total: 28 students]

Using the figures given in the EIS, it is evident that Lewis and Clark County may experience 3 times the amount of growth (from in-migration) that may occur in Jefferson County. However, **the applicant for the Montana Tunnels project has not indicated that Lewis and Clark County would be compensated in any way for this growth.**

The EIS states that the Helena schools have the space to accommodate the additional students that would result from in-migration (due to the Montana Tunnels project. According to Roger Eble, superintendent for School District #1 (which includes Helena and a significant portion of the Helena Valley), although the district has not yet reached capacity, the assumption is that growth will continue along similar growth patterns in the past. A sudden influx of additional students could significantly affect the capacities of the various schools in the district. In addition, it is more desireable to plan for, and begin constructing additional schools, before capacity becomes a problem.



C Alternative 1 is the applicant's proposal. Alternatives 2 and 3 incorporate mitigating measures that DSL has determined would reduce the impacts of the applicant's proposal. The alternatives were constructed so that the applicant's proposal could be compared with other reasonable alternatives. DSL's preferred alternative was identified in the draft EIS as either alternatives 2 or 3. In this document, the Notice of Adoption of the draft EIS describes DSL's proposed course of action.

D The analysis of impacts to Lewis and Clark County government services due to the project shows only negligible impacts, even under extreme-case conditions. The high in-migration estimate assumes that the company cannot meet the goal of hiring 80 percent of the work force locally. However, even in the extreme-condition analysis, only minor impacts might occur to schools, law enforcement, and possibly rural volunteer fire departments, and such impacts depend solely on the distribution and age characteristics of in-migrating people.

Lewis and Clark County has a much larger population and housing base than does Jefferson County. It is incorrect to say that Lewis and Clark County will experience three times the growth that Jefferson County will because the projected in-migration to Lewis and Clark County could be three times higher than that expected in Jefferson County. Lewis and Clark County has ample housing and service capacity to absorb 113 new households. Such an increase represents less than 1 percent of the 1984 estimated population and fewer than one-fourth of all the homes for sale in southern Lewis and Clark County in August of 1984 (Mountain International, Montana Tunnels Project Hard Rock Mine Impact Mitigation Plan for Jefferson County, Montana, July 1985, p. 98).

Mitigations for impacts to community services in Lewis and Clark County have not been suggested because such impacts may not occur and, if impacts do occur, the effects will be minor. If newcomers concentrate in one neighborhood, negligible impacts could occur to some elementary schools. However, negative effects are expected to be easily managed. New schools will not be needed; increased elementary enrollments could be shifted between schools, teachers' aides, or a few more teachers could be hired. With the exception of the Four Georgians elementary school, all Helena elementary, middle, and high schools have capacity to handle 100 additional students (Roger Eble, superintendent, Helena Schools, in DEIS, p. III-81). Even in the extreme-case scenario, education impacts will be negligible.

E 2. In addition, according to the EIS, Lewis and Clark County provides a greater availability for housing. The EIS also states that "more workers may settle in Helena area due to its cultural, educational, and economic amenities. For these reasons, are the population projections (resulting from in-migration) accurate for Lewis and Clark County?

F 3. The EIS states that the sheriff departments for both Lewis and Clark County and Jefferson County are understaffed. According to the EIS, "additional law enforcement problems in the study area could result if the project attracts transients migrating to the area seeking employment. New developments such as the proposed mine often attract unemployed people who may commit crimes."

While the EIS addresses people who would move to the area and be hired to work at the Montana Tunnels project, it does not address the additional influx of people who would not be hired. These additional people would also be bringing their families, which would also include school-age children.

G 4. The EIS states that [Lewis and Clark County] "rural areas are served by volunteer fire departments which are not adequately equipped to fight major fires. Newcomers moving into rural areas would increase the demands on these volunteer departments." As stated previously, the EIS indicates that Lewis and Clark County will receive approximately 3 times more growth than Jefferson County. Although the EIS states that the applicant has committed to making donations to local fire departments, the **applicant for the Montana Tunnels project has not indicated that local fire departments (located in Lewis and Clark County) would be compensated in any way for this growth.**

III. Conclusion

H In summary, the EIS indicates that Lewis and Clark County may recieve significant increases in population, and various hydrological and sociological problems related to this growth. However, the applicant has not addressed any of the potential problems that relate to Lewis and Clark County. It appears that the applicant has assumed that since the Montana Tunnels project would be located in Jefferson County, that potential problems resulting in adjacent Lewis and Clark County (from the Montana Tunnels project) do not merit consideration.

**Lewis and Clark County requests ways to mitigate the potential hydrological and sociological effects, as identified in the EIS, that would be created by the Montana Tunnels project. These hydrological and sociological effects must be addressed in a more comprehensive manner. Please require the applicant to consider the concerns of Lewis and Clark County more seriously.**

Sincerely,

Bob Decker, Chairman
Lewis and Clark County Commissioners



E It is difficult to predict population growth. DSL used two scenarios--one highly probable and the other less probable. The low scenario population projection is based on the company's commitment to hire 80 percent of the work force locally. The high scenario was designed to show the effects on community services of an extreme condition, which is not likely to occur.

F Law enforcement impacts in Lewis and Clark County are expected to be minor. The DEIS (p. III-82) states that more sheriff's deputies are needed in the county now. The company's commitment to hire locally should discourage transient jobseekers from coming to Helena, so that only related law enforcement problems should be limited.

It is unknown if and how many transient job hunters would come to the study area to seek project jobs. To assume that such people would contribute significantly to social problems or school crowding is premature. As noted earlier, the company's commitment to hire locally should discourage in-migrants looking for jobs.

G Volunteer fire departments are already inadequately equipped to fight major fires; the company is not required to alleviate existing service shortfalls. Furthermore, impacts to such fire departments depend on the location of newcomers. If in-migrants are scattered throughout the Helena-East Helena area, impacts, if any, will be miniscule (see also answer H).

H The EIS does not conclude that population impacts to Lewis and Clark County will be significant. Even under extreme conditions, in-migrants due to the project are expected to be less than one half of one percent of the Helena-East Helena area 1985 estimated population. Moreover, the EIS concludes that the high population increase scenario may produce only negligible impacts that can be managed easily. The service problems in law enforcement and volunteer fire departments are existing conditions which are the responsibility of the county. The probability of the project causing serious aggravation to such problems is small.

The company prepared a hard-rock mine impact mitigation plan for Jefferson County as required by law (MCA, 90-6-300 to 90-6-311). The plan was subject to a period of public review from July 8, 1985, through October 7, 1985, and was approved October 24, 1985. Lewis and Clark County had the opportunity to review the plan and comment, and could have petitioned to be included if the county expected impacts due to the project.

The Hard-Rock Mining Impact Board has not adopted a formal policy or rules as to how a county or other local government originally excluded from an impact plan could be added to the plan. However, the board did discuss this topic at a meeting and the following procedure might be considered. This procedure is excerpted from in a letter from Carol Ferguson, Administrative Officer, Hard-Rock Mining Impact Board, November 7, 1985.

A local government unit, not originally included in an impact plan, might experience a need to increase services as a result of the mineral development. If a) this need had not been identified prior to the approval of the plan and, consequently, b) the local government unit itself had not been included among the affected government units listed in the plan, the following procedures could be used.

A. Based on the discussion at the board meeting, it appears likely that the following procedure might be followed:

   1) The local governing body identifies the increased need for and cost of services that are a result of the mineral development;
   2) The governing body petitions the Board to amend the impact plan;
   3) The Board reviews the petition not to determine its accuracy but to ascertain whether there is probable cause to believe the local government unit may have experienced increased service needs and costs as a result of the development;
   4) If the Board finds probable cause, then it might acknowledge the standing of the local government to file the petition, without prejudice to the specifics of the petition, and allow the petition to proceed through the process set forth in 90-6-311, MCA, for petitioning to amend an approved impact plan.

B. The Board might declare that any local government unit with reasonably foreseeable potential for experiencing adverse impact should have had that potential acknowledged in the plan in the first place to ensure future standing. But, that doesn't address the possibility of a legitimate "unforeseeable" situation.

Hydrologic problems related to Lewis and Clark County are discussed on page IV-8 of the DEIS. The results of a water availability analysis for Prickly Pear Creek near East Helena are presented in table IV-2. This analysis indicates that under Alternative 1, downstream senior appropriators in Lewis and Clark County would be affected by the proposed project.

Under alternatives 2 and 3, measure A (page II-32 of the DEIS) would protect Lewis and Clark County water users who have water rights pre-dating those of the applicant.

GALUSHA
HIGGINS &
GALUSHA
HELENA, MONTANA

CERTIFIED PUBLIC ACCOUNTANTS
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ARCADE BUILDING
111 NORTH LAST CHANCE GULCH
HELENA MONTANA 59624
TELEPHONE 406/442-5520

December 24, 1985



Mr. Dennis Hemmer
Commissioner of State Lands
State Capitol Building
Helena, Montana 59620

Re: Montana Tunnel Project

Dear Mr. Hemmer:

We would like to add our support for the most expeditious handling of the development out of Clancy.

As we all know, the hearings and so forth have been very positive but there is still a tremendous amount of red tape that has to be circumvented to get it converted to the badly needed jobs in Montana.

As an active participant since the beginning of the "Build Montana and Ambassadors Program," I would like to personally urge every effort to expedite this project and assure you that any way we can be of assistance, we will be glad to do so.

Sincerely yours,

S. CLARK FYFER, C.E.O.
SCF/ag

Comment noted, thank you.

United States Department of the Interior

BUREAU OF MINES

WESTERN FIELD OPERATIONS CENTER
EAST 360 3RD AVENUE
SPOKANE, WASHINGTON 99202

December 24, 1985

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JAN 02 1986
STATE LANDS

Mr. Kit Walther, Chief
Environmental Analysis Bureau
Reclamation Division
Montana Department of State Lands
1625 11th Avenue
Helena, Montana 59620

Dear Mr. Walther:

RE: MONTANA TUNNELS MINING PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Following the mining of the mineral bodies which is the specific goal of the Montana Tunnels project, the most important remaining natural resources in the immediate vicinity of the project will likely continue to be unmined mineral natural resources. The authors of the draft EIS totally ignored this most important natural resource.

We advised your office by phone on April 30, 1985, of the need to address these resources in the EIS, and shortly thereafter advised Mr. Allen Richardson at the company office. Specifically, we are concerned that the EIS address the mineral natural resources as follows:

A. What grade and estimated tonnage of minerals will remain; 1.) in mine tails and mill tails; 2.) beneath mine or mill waste and tailings piles; 3.) beneath plant facilities and; 4.) below or adjacent to planned pit limits?

B. Could the mineral resources remaining in the adjacent mines (Alta, Mina, Gregory) be processed through the proposed mill; there-by benefiting from this project?

C These questions should have been addressed and answered in the section "Remainder of the Project Area," beginning on page III-4. In addition to describing mineral resources in these areas, we ask that the report evaluate the possibility for both beneficial and adverse impacts on these resources from the proposed project. Unless the authors address these important natural resources and potential effects upon them, they have not complied with NEPA [note especially 40 CFR Chapter V, Part 1502.15 and 1502.16(f)].

A Estimated grade and tonnage of minerals remaining in the mill tailings and in the waste rock dump are:

| Material | Mineralized tons | Grade |
|---|---|---|
| Mill tailings | 50,000,000 | 0.001 oz. gold/t<br>0.14 oz. silver/t<br>0.12 percent zinc<br>0.135 percent lead |
| Waste rock | 60,000,000 | 0.004 oz. gold/t<br>0.3 oz. silver/t<br>0.2 percent zinc<br>0.09 percent lead |

Geologic reconnaissance mapping and sampling by the applicant has suggested limited mineral potential underlying the proposed tailings impoundment and waste rock dump. In addition, because of the excessive overburden and low-grade nature of the mineralization underlying these areas and the results of condemnation drilling, the applicant believes that no economic or reasonable sub-economic resource potential exists under these areas.

Limited drilling of the plant site has similarly demonstrated the unmineralized nature of the underlying volcanic bedrock.

Mineral resources exist below the proposed pit and adjacent to the pit. However, grade projections from the known reserves in the pit to the presently unexplored resource below the pit floor indicate the material is uneconomic in today's metal market due to the high stripping ratio. Therefore, the grade and tonnage of this material has not been accurately delineated.

Waste rock that would remain in the pit walls has shown very erratic grades of mineralization. The company believes that a realistic estimate of this resource is also not possible. Furthermore, it would be unreasonable to initiate a drilling program to delineate the grade and tonnage of material that is not economically mineable.

Nevertheless, the applicant estimates that the diatreme contains 139 million short tons of mineralized rock. Assuming that 50 million tons of mineable reserve is extracted, then 89 million short tons of an undetermined grade would remain unmined.

The applicant's economic ore body is based on the prevailing economy, metals index, mining methods, and a multitude of other factors. The pit limits may realistically change through time should present factors affecting the project's economics change. However, any change in the applicant's production plans would probably require an amendment of the operating permit. This would change any estimates regarding residual ore under and adjacent to the proposed final pit.

B The old adjacent mines do not contain known economic mineral resources; therefore, the question of processing these resources through the proposed mill is largely academic. In addition, the old mines are on differently mineralized structures which are not amenable to the mining method proposed by the applicant. Even if economic mineral resources could be mined, significant changes

4/

D Aside from this one serious oversight, most of the report has abundant detail and is well written for easy comprehension. We wish to suggest items that should be added to the table on page vii of the summary. Because the metals from this mine are very much part of an international market, impacts at the national level should be described. These are "Increased revenues to Federal Government" and Increased National Self-sufficiency in minerals" for Alternatives 1, 2, and 3.

E For Alternative 4 it should add, "Increased trade deficit" and "Decreased number of jobs nationally." These national perspectives should also be summarized briefly in the second paragraph of page vof the summary.

F There is the appearance of a contradiction between the second paragraph of page xi of the summary and the data on page IV-26 of the Wildlife section. The mine would not significantly reduce wildlife habitat for this region. To compare "significance" for the permit area only is pointless with respect to the natural range limits of elk and deer.

Thank you for the opportunity to review this draft manuscript.

Sincerely,

J Satkowski

For D'Arcy P. Banister, Supervisor
Minerals Involvement Section
Branch of Engineering Studies

would be required in the milling circuit (most likely crushing and grinding) before ore from the adjacent old mines could be processed. These changes most likely could not occur until the end of the project life.

C The only irreversible or irretrievable commitment of mineral resources caused by the project is that of extraction of the ore body. This resource commitment was described in the draft EIS (see Chapter V). No other mineral resources would be affected adversely or beneficially by the project.

Please note that the Montana Tunnels project EIS was prepared in accordance with Montana's Environmental Policy Act (MEPA) rules.

D The additional topics that you suggest were not included in the EIS because of the paucity of project impact on either. The project contribution to increased federal revenues will be a miniscule portion of total federal revenues--less than one-thousandth of one percent. Project gold production will not contribute a noticeable quantity to total U.S. gold production.

E The effect of the project on the national trade deficit and the number of jobs nationally was not included in the EIS because the project effect will be statistically miniscule. Although the project employment and income is highly important to the Jefferson County economy and to the State of Montana, its impact will be meager in terms of national statistics.

F There is no contradiction between the summary on page xi and page IV-26 of the DEIS. The summary states that "possible failure of 195 acres of reestablished grassland on the tailings impoundment site together with the excavation of a 162-acre open pit would significantly reduce wildlife habitat in the permit area." (Emphasis added.) We assume that the "data" you refer to on page IV-26 are the first sentence on the page and parts of the fourth full paragraph. However, these statements refer to populations of mule deer and elk in the study area, not their habitat in the permit area.

Evaluating the significance of habitat reduction in the permit area is appropriate when the reclamation goal of restoring wildlife habitats is considered. The ability of displaced animals to range into surrounding habitats is discussed throughout Chapter IV--Wildlife in the draft EIS.

Dec. 29, 1985

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JAN 02 1986
STATE LANDS

Mr. Kit Walther, Chief
Environmental Analysis Bureau
Montana Department of State Lands
Capitol Station
Helena MT 59620

Dear Kit:

My comments on the DEIS for the proposed Montana Tunnels mine are attached. The review was done for a private client, who is concerned that the project does not lead to further degredation of water quality in the Prickly Pear drainage.

Thank you for taking the time to answer my questions about water quality concerns today. Dan Ashenberg was also a great help in clarifying the ground water and surface water relationships in the Corbin Creek-Lower Spring Creek area.

Sincerely yours,

Ray W. Breuninger

Ray W. Breuninger, Ph.D.
Consulting Geologist

streamworks
614 hollins • helena, montana 59601 • (406) 443-7084

# LETTER 22

A Monitoring. Pages II-14, II-29.

The DEIS lacks both general and specific information on the water-quality monitoring plan. A listing of chemical parameters analyzed is needed, and also a discussion of sampling sites and frequency, how future monitoring will be tied into ongoing monitoring, who will do the monitoring, and anticipated weaknesses and possible problems in the program.

B Leakage from Tailings Impoundment. IV-10, 11.

Fifty-year storage of leakage in the sediment and rock below the pond seems improbably long; a discussion of the method of calculation and the calculation's accuracy needs to be in the DEIS. Also, in view of the difficulties in calculating exact seepage rates, the DEIS should give a range of values from best to worst case, or alternatively it should give citations of measured rates of seepage from existing similar ponds. This would give a much better picture of the potential for major failure of the pond than does the theoretically precise but admittedly inaccurate 14 gallons per minute cited in the DEIS.

C Concentration of Pollutants in Prickly Pear Creek. IV-8 (Prickly Pear Creek); IV-13 (Aquatics).

For Alternatives 1, 2 and 3, the DEIS should consider the possibility that contaminated ground water from abandoned mines in the Corbin Creek area that reaches Prickly Pear Creek near Jefferson City would be diluted less than at present in Prickly Pear Creek, by approximately 35%. The resulting increase in concentration of toxic materials would happen whenever the base flow of Prickly Pear Creek was decreased by approximately 10 to 35% during mine operation, as predicted by the DEIS.

This process could occur even if it is assumed that there is short-temrm storage of the contaminated water through a slowing of ground-water flow in the lower Spring Creek drainage, while Spring Creek is dewatered to supply mine water. The contaminated ground water would be stored temporarily, but would eventually emerge along Prickly Pear Creek.

Our concern is that the water quality and fishery between Clancy and East Helena not be degraded by an incremental increase in the concentration of toxic substances in the water of Prickly Pear Creek.



A Please refer to the response to letter 1, comment A.

B An estimate of the time required for the alluvium under the tailings impoundment to reach specific retention moisture content is presented on page IV-11 of the DEIS. This estimate is based on a lumped-parameter method presented by Mr. Steven G. Vick, geotechnical engineer, and probably North America's leading authority on tailings disposal, in his book entitled Planning, Design and Analysis of Tailings Dams (1983). Calculations which support the discussion on page IV-11 of the DEIS are presented in Technical Support Appendix A.

Assumptions and methodology for calculating seepage quantities are summarized in Technical Support Appendix B.

A table comparing laboratory test results and storage facility characteristics at other tailings disposal facilities which utilize sub-aerial deposition techniques is presented in Technical Support Appendix C.

A technical paper published by the Canadian Geotechnical Society which describes the sub-aerial deposition concept and application is available for review at the Department of State Lands.

C This comment appears to imply that a) water quality in Prickly Pear Creek could be degraded during mine operations as a result of diverting Spring Creek surface water immediately below the confluence with Corbin Creek, and b) assuming Spring Creek is diverted below the confluence with Corbin Creek, the existing "slug" of contaminated ground water moving toward Prickly Pear Creek through Spring Creek alluvium would have a greater impact on Prickly Pear Creek water quality during periods of low flow.

To answer this question, one would have to compare the ground water loading of metals to Prickly Pear Creek from Spring Creek alluvium versus the loading of metals to Prickly Pear Creek from Spring Creek surface water during base flow conditions. If ground water loading is greater than surface water loading during base-flow conditions, then the points raised in comment C are substantiated. That is, Spring Creek has a diluting effect on overall water quality. If the surface water loading during base-flow conditions is greater than the ground water load, then this issue is moot, and the action of diverting Spring Creek below Corbin would not further degrade water quality in Prickly Pear Creek, as is stated on page IV-8 of the DEIS.

An estimate of contaminant loading to Prickly Pear Creek follows:

Ground Water Load to Prickly Pear Creek

Assumptions (data from Stiller, OEA, 1983)

Hydraulic conductivity: K (ave) = 10,305 gpd/ft²
Saturated thickness: b (ave) = 6.7 feet
Hydraulic gradient: I (ave) ≅ $\frac{140'}{7040'}$ ≅ .02

Valley cross section: W (ave) ≅ 200 feet

Methodology (Darcy Analysis)

Q = KI(wb)
Q = 0.43 cfs (or 1,045,554 liters/day)

| Parameter | (Stiller, 1983) Concentration (mg/l) | Load mg/day) |
|---|---|---|
| Cadmium | 0.005 | 5,228 |
| Zinc | 4.2 | 4,391,327 |
| Iron | .06 | 62,733 |
| Arsenic | <0.002 | -- |

Surface Water Load to Prickly Pear Creek

(Data from MDHES, 1977)

Spring Creek discharge at base flow = 2.88 cfs
Q = 2.88 cfs
Q = 7,044,882 liters/day

| Parameter | Concentration (mg/l) | Load (mg/day) |
|---|---|---|
| Cadmium | 0.013 | 91,583 |
| Zinc | 5.4 | 38,042,362 |
| Iron | 2.4 | 16,907,716 |
| Arsenic | 0.017 | 119,763 |

Conclusion: The data indicates that during base-flow conditions, Spring Creek surface water contributes more than 17 times the load of cadmium, 8 times the load of zinc, 270 times the load of iron, and many times the load of arsenic compared to ground water sources.

Therefore, Spring Creek does not have an overall diluting effect on water quality in Prickly Pear Creek. Diverting Spring Creek below Corbin would not further degrade water quality in Prickly Pear Creek, as is stated on page IV-8 of the DEIS.

Note that water quality impacts on Prickly Pear Creek as a result of historic mining activities have been the focus of numerous studies by federal and state agencies as well as private consultants. In April 1983, a master reclamation plan for abandoned mines in the Corbin-Wickes area was prepared by David Stiller and Associates and by OEA Research. The objectives of this plan were to document the extent and severity of impacts associated with past mining and to prepare reclamation plans to achieve more acceptable water quality.

In mitigation, polluted ground water could be pumped from several wells sited near the lower end of Corbin Creek. This water could be added to that from Spring Creek (as proposed by Alternatives 2 or 3) and used at the mine. This would reduce the quantity of polluted ground water in the lower Spring Creek area, and thereby assure that Prickly Pear water quality will not be degraded indirectly by the mine operation.

D Tailings Disposal Facility. II-8, 9, 10.

Case examples of success or problems with this design (or similar designs) are needed, because it seems that portions of the design are new and to some degree experimental.

E Process Return Pumping (Recovery Wells). II-32.

These wells would be needed whether or not the tailings impondment were lined with poly sheeting, because the long-term integrity of the lining and other sealing measures is not certain. Ponds have leaked seriously on other projects in Montana, notwithstanding the pre-construction assurances that significant leakage or breaching could never happen.

The U.S. Geological Survey also made this point in its Dec. 6 comments on the project.

Breuninger (1984) in A Stream Corridor Management Plan for Prickly Pear Creek correctly summarizes Stiller's principal strategy for addressing metals contamination in Spring Creek as the:

> ". . . prevention of ground and surface water from coming into contact with toxic materials such as pyritic waste dumps and underground mine workings."

Diversion of Spring Creek at the confluence of Corbin Creek is one method of implementing this strategy and is consistent with the loading analysis presented above.

D Please refer to response B.

E Please refer to the response to letter 1, comment B.

This letter is a typed reproduction of a handwritten, signed letter that was received by the Department. The letter was typed for ease of reading after publication.

Mr. Kit Walther:

A After reading the EIS on the Montana Tunnels mining project, my only concerns would be about Clancy Creek (covered somewhat at last meeting in
B Clancy) and the statement referring to 50% of workforce from Silver Bow County (Ref. Employment / IV-35). I feel that Jefferson County and Lewis and Clark should be considered first. Other than this, I feel all in favor of it.

Yours Ronald E. Larsen
Box 161
Clancy, MT 59634

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A Impacts to Clancy Creek from the proposed mine operation are discussed on pages IV-4 to IV-5 of the draft EIS. The response to letter 17, comment B expands on this discussion and presents calculations and a methodology which support the findings contained in the draft EIS.

B The statement that 50 percent of the work force would be from Silver Bow County was an assumption used by the company in the hard-rock impact mitigation plan for Jefferson County. The company has committed to hiring at least 80 percent of its work force locally. The number of employees hired from Jefferson, Lewis and Clark, and Silver Bow counties will depend on the qualifications of applicants. However, the company has identified a pool of unemployed workers in Silver Bow County with experience in open-pit, hard-rock mining. Some of these people possess skills which require years of training and experience to develop and would probably be hired by the company.

Dec. 28, 1985



Kit Walther
Dept. of State Lands
Capitol Station
Helena, MT. 59620

Dear Kit:

I am a native Montanan, transplanted to Idaho, and would like to express some concerns about the Montana Tunnels gold mine project near Clancy. There seem to be some pertinent environmental factors that are perhaps being overlooked in favor of a larger emphasis on jobs and income. Mr. Ray Breuninger has addressed some specific environmental concerns relative to groundwater ponds, drainage, etc. which need to be seriously dealt with. Please look into these issues and ALL of the opinions being expressed (as well as all of the data and information that has thus far been obtained) with a fine toothe comb before delving into this complicated project. Thank you very much for your consideration on this matter.

Sincerely Yours,
Beverly Beck Glueckert

Beverly Beck Glueckert

12472 Indio Ave.
Orofino, ID 83544

Thank you for your comments. Please refer to the responses to letter 23.

CENTENNIAL PUBLIC HEARING
MONTANA TUNNELS PROJECT
December 18, 1985

WALTER JOHNSON:

Thank you very much. My name is Walter Johnson. I live at 2640 Cole, East Helena, Montana. We moved there 6 months ago and we anticipated this move well over a year and a half ago and my wife and I are both presently working in Helena. I am seasonal with the Forest Service, but I've still got mining in my blood and I can tell you from looking at this book, after working for the Anaconda Company 14 years that the State of Montana and Centennial have done their homework and it is good. We all knew that there was going to be room for improvement in this statement and that is what this meeting is about tonight. So, I just want to say at this point that the homework has been done and let's get on with it because Montana needs the jobs. Thank you.

Comment noted, thank you.

DON JENKINS:

My name is Don Jenkins. I am Administrative Superintendent of the Golden Sunlight Mine in Whitehall. I would just like to add my consent or approval of this project. I, too, agree that the State Land Department, whom I worked with for many years, and Centennial have done their homework and I think this is a viable project and it should a "go" project. I would also like to add that in my responsibilities at the Golden Sunlight Mine I am also the personnel director and I understand the John Fitzpatrick is going to take over here and I am very happy to see that because he can relieve me of some of my load down there. I have 3,000 applications in my files for work. We only employ 145 people. So, John, you can have the rest of them. Thank you.

Comment noted, thank you.

BOB MARKS:

Thank you. I am Bob Marks, a local rancher and taxpayer and have been here all my life and I reviewed the environmental impact statement carefully. I read it as carefully as you can read a document that thick and try to analyze it. I think that the people who put it together did a good job and they covered most of the areas that concern people. I think the process that Centennial went through in the application and review and the process through the Hard Rock Mining Board seem to indicate that the people in local government and schools that would likely have some impact were able to mutually agree on that and that has been done and I think that the idea of being able to find 300 or so more jobs in this area is particularly appealing when we see in the state, jobs are leaving the state rapidly. In the last several years we watched several thousand of our primary jobs, such as the ones that would be offered here, high paying jobs I might add. Mining is one of the highest paying work forces in the state. But, speaking not just for Montana, but for the area that we live and area I've lived in for 53 years. We are one of the highest taxed districts in the whole state as far as school districts are concerned. Well over 300 mills right now. Those of us who can't leave the state, such as people who own land--and you can't take it with you--would like to have some help in spreading the burden of government to some other neighbors who would produce jobs. If this enterprise were to succeed as it is anticipated, it will potentially increase the tax base of this local school district by over 150 percent. That means that those of us that are in business and those of us who are homeowners in this area would find that probably our taxes would be cut in half if we can control the spending side of it a little bit. I think the jobs is a particularly good one. I think that Don Jenkins mentioned he still has on file about 3,000 applications for jobs. I think it indicates a real need. It is not the rape-and-scrape kind of job that some mining has been eluded to have. It is well thought out. Carefully thought out. I wouldn't be standing here recommending this if I didn't think it was because the property that I own and my family has owned for nearly 100 years is almost adjacent to it and if there were impacts that would be unfavorable to us, I think I would be one of the first ones to react. I am particularly pleased, I think, that the way mining can occur with provisions that have been provided in a statement such as the one presented. The one in the south end of our county, Golden Sunlight, has been a great asset to our county; put around 200 people to work at different times. It has increased the taxable value of our county and it has helped share some of the burdens of providing services through government agencies so that other taxpayers don't have to pay quite as much. I would certainly support the proposal that has been presented and I think that if we could get a few more of these in our state we would be in much better shape than we are today.

Comment noted, thank you.

RUSS CRAVENS:

I am Russ Cravens, President of the Helena Area Chamber of Commerce, and I am here tonight on behalf of the Board of Directors in support of the Montana Tunnels project. We have reviewed the environmental impact statement produced here and we believe that it reflects what we have felt all along with our relationship with this project. That the people that are proposing the Montana Tunnels project conscientiously strive to develop a gold mine in this area that meets the laws and the concerns of the state of Montana and the people who live here and will provide some very much needed jobs and other opportunities for those of us who live here.

I think that the area I would comment on briefly that there is discussion about the economic impact and the income in the area of Helena as it relates to this. I think part of that, however, is simply numbers in the millions and hundreds who will be working at the mine, but doesn't reflect what I think the people in this room reflect and that is the real concern, the real need, for employment in the area. I did some pencilling recently with some information from the Census Bureau that suggested that the per capita income in Montana was about 10 percent, on the average, lower than the per capita incomes in the surrounding states. I think in the last several years we have seen much of that blamed on the number of primary and basic jobs that have left the state and I think that it is absolutely important to the people who live here, whether they work for this mine or simply in the area, that we do whatever we can to build on that per capita income and the quality of life that it represents for all of us. So, with that I just want to, again, the Helena Area Chamber of Commerce supports the project and believes that the environmental impact statement is well done and recognizes the real work of the people involved in the project to do a quality project that is going to enhance the living for all of us here.

Comment noted, thank you.

GENE DONALDSON:

Thank you, Mr. Chairman. I guess I'm kind of wearing two hats here. For the record my name is Gene Donaldson. I am a rancher in the Helena valley, a water user on Prickly Pear Creek, and also a legislative representative of the East Helena and Helena valley area. I haven't read the whole impact statement. I have read portions of it that I thought were particularly critical to our area. I was concerned a little bit about the water quality and quantity in Prickly Pear Creek and, after reviewing it, I cannot see where this is going to impact either to any large degree. The thing I would like to suggest, I guess to John or whoever might be representing the corporations tonight, is that the water users of the Helena valley have worked very closely with such industrial groups as ASARCO and also Permanente and I guess I would like to have you perhaps come out to our water meeting in March to discuss this venture and I think that we can, if there are problems that occur down the road, we can help to be part of the solution as well as you. I think it is well that we work together.

Basically, from the concerns of the economics of the state and of the area, I would just like to point out that this last year, fiscal year 1985, we lost 2,600 jobs in the state. They were the top-quality jobs, the jobs that paid the most. We have the distinction of being among the three states in the union that had a loss in our personal income and I think we've got to look very closely at what we are doing as far as economics in this state. In reviewing as closely as I can in discussions with people in the mining industry, it appears that this is a good project. It is a project that can be carried off without great detriment to the environment. One that is going to provide a lot of jobs and I guess I would like to pledge my commitment to the Department of Lands and to the company that we certainly want to work toward making this project a reality and again, I would hope that the water users in the valley could work with you relative to any concerns that come up. Thank you.

Comment noted, thank you.

RAY BREUNINGER:

Thank you. My name is Ray Breuninger and I am a consulting geologist in Helena and I have been hired by a private client to make a brief review of the hydrology and geology sections of the EIS. We are concerned primarily with the overall safeguarding the water quality and the environment in the entire drainage. My impression in reviewing the document, is that it has a tremendous amount of very valuable information and there has been a lot of thought that has gone into the design of the safeguards to water quality and so that criticisms that I do have should be taken in that perspective.

A My first comment has to do with the monitoring program for water quality. If both the ground water and the surface water are to be monitored for dangerous constituents--it talks of metals and so forth--the draft EIS doesn't give any details about the monitoring plan and I think that the EIS could and should include some information as to the specific chemical parameters, such as the specific metals, the pH, and some of the other water quality parameters that could be monitored and should be monitored. Also, the scheduling of the monitoring and at least some ideas for spacing or location of the monitoring sites. For example, if you are monitoring ground water, it would be nice to know where they are going to put the wells, at least in general. I realize you don't have a final design available, but I think some intermediate-level information could be given along these lines.

B My second comment deals with the leakage from the proposed tailings pond. This is the pond that will trap most of the material that has the potential for contaminating ground water and streams. You propose to have, I shouldn't get into the details, they are in the EIS. But, basically, I am concerned about leakage from the bottom of the tailings pond. The EIS in section IV-11 briefly describes some calculations that lay out the time, something like 50 years, that the predicted leakage could be retained in the sediment below, or the material below the pond. I realize that is an approximate calculation. My concern is not as much with that as the fact that my experience in that area shows that this material could be very permeable. In other words, water could flow through it very easily and I think it is possible that contaminated water would not be stored in that material, but would rather sink on down to the ground water level to the saturated zone and then flow downgradient into the Spring Creek and eventually the Prickly Pear Creek area. We are talking about small quantities of water here, but I do think this should be addressed in the EIS.

C Suspended sediment is a problem in this drainage and the EIS goes into quite a bit of detail on how to control erosion of soil and placed rock and so forth with various drainage channels and a couple of small sediment ponds. The EIS is pretty vague about the design of those sediment-trapping ponds. Basically, the EIS says that they are designed for a 10-year, 24-hour event. In other words, a flood that is likely to cause erosion, the least flood that is likely to cause erosion in 24 years in a day period. I would like to know how much sediment the pond is designed to trap for that flood. What is the trap efficiency of the pond? And perhaps some other related details. Maybe a citation of the method that is used. This is important because if the pond fails, say during a spring runoff, then the sediments may be carried on down. It could be even more important if it occurs during a low-flow period later on in the summer. Or during a period when fish, for example, down in the Clancy

A See response to letter 1.

B See response to letter 23, response B.

C The information requested has been reproduced from the permit application as Technical Support Appendix D.

to East Helena area could be affected. And we do have a pretty decent fish population down in the lower or middle section of Prickly Pear. It is well worth taking every effort that we can to protect that existing fishery.

D My fourth point has to do with pollutants reaching Prickly Pear Creek. The EIS states that the base stream flow just below Jefferson City would be decreased by roughly 35 percent. This is an approximate calculation and it sounds reasonable. Further downstream, near the U.S.G.S. gauging station, which is a mile or so below Clancy here and then narrows just this side of Montana City. The base flow of the stream is predicted to decrease by about 10 percent. I am concerned, and here I must admit I haven't had time to review the EIS very carefully, there may be more information than I've had a chance to dig out. The point that worries me a little bit is that we have a very steady influx of heavy metals and various toxic substances coming into Spring Creek strictly from the Corbin Creek area. This is coming from the old Alta Mine and a couple of other old mines in that area and there are some other sources on downstream. If that material, those toxic wastes, continued to be dumped at roughly the same rate into upper Prickly Pear--say in the Jefferson City area, they are going to be entering less water, say 35 percent less water and they could be concentrated. So, although all of the absolute amounts of these contaminants would not be increased by the proposed Montana Tunnels mines, I suggest that the EIS should at least suggest that the possibility that the concentration of these contaminants could be increased, and this would be particularly important to know whether this would happen or not during low flows where the dilution effects of the Prickly Pear flow would be the least. Again, I would like to point out that I am not sure this would happen. I haven't had time to really dig into it, but I would like to see something more about it in the EIS. I could be way out in left base on that one.

E My final point deals with tailings disposal facility in general, the tailings pond. As I read the EIS, I get the impression that this is a fairly new design that hasn't been tested and the EIS, as far as I could tell, didn't site any specific case examples of where this design or one very similar to it has been used in other places and it would be nice to know if it has been used elsewhere and if so, was it successful or was it not successful. The design certainly sounds pretty good to me, but it would be nice to have some backup on that. If it is a totally experimental new design, then the EIS, perhaps, could expand a little bit on its probabilities of its failing or succeeding.

D See response to letter 23, response C.

E See response to letter 23.

# References Cited

Knight, R.B., and J.P. Haile. 1983. Sub-aerial tailings deposition. Pages 627-639, In: PanAm '83--Proceedings from the Seventh PanAmerican Conference on Soil Mechanics and Foundation Engineering, Vancouver, British Columbia, Canada. Published by the Canadian Geotechnical Society, Rexdale, Ontario, Canada.

Streamworks. 1984. Prickly Pear Creek: a stream corridor management plan. Report for Jefferson and Lewis and Clark Conservation Districts. Helena, MT.

# Consultation and Coordination

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REVIEW

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## PEOPLE, AGENCIES, AND COMPANIES CONSULTED

The following people and companies (other than those cited in the text) provided information used to analyze the Montana Tunnels project:

Montana State Board of Education, Helena (State Historic Preservation Program)
Montana Department of Administration, Research and Statistical Services (Helena)
Montana Department of Commerce, Economic and Community Development Division (Helena)
Montana Department of Commerce, Hard Rock Mining Assistance Board (Helena)
Montana Department of Fish, Wildlife and Parks (Helena)
Montana Department of Health and Environmental Sciences, Air Quality Bureau and Water Quality Bureau (Helena)
Montana Department of Justice, Highway Traffic Safety Section (Helena)
Montana Department of Highways, Planning and Research Bureau (Helena)
Montana Power Company
U.S. Department of the Interior, Bureau of Land Management

## REVIEW OF THIS STATEMENT

In accordance with environmental law, copies of the draft EIS were sent to the public for comments and suggestions. All comments were carefully considered by the agencies. All comments received either by mail or as public testimony are included in this document.

The draft EIS and this Notice of Adoption are available for review in the following places:

Boulder Community Library, 201 S. Main, Boulder, Montana
Butte Public Library, West Broadway, Butte, Montana
John Gregory Memorial Library, 2 N. Whitehall, Whitehall, Montana
Lewis and Clark Library, 120 S. Last Chance Gulch, Helena, Montana
Montana College of Mineral Science and Technology, West Park Street, Butte, Montana
Montana Department of State Lands, 1625 11th Avenue, Helena, Montana
Montana State Library, 1515 E. 6th Avenue, Helena, Montana

# Appendixes

TECHNICAL SUPPORT APPENDIX A

Calculation of Storage Available in the Partially Saturated Zone

Reference: Vick, Steven G. 1983. Planning, Design and Analysis of Tailings Dams. John Wiley and Sons, New York. Pages 274-277.

| | |
|---|---|
| Porosity (n) | 0.30 |
| Water content (w) | 0.05 |
| Specific retention (SR) | 0.20 |
| Zone of alluvial material | 100 acres |
| Depth to water | 80 feet |
| Maximum seepage rate (q) | 14 gpm = 23 AF/yr |
| Maximum seepage time | |

10 years (project)
\+ 5 years (consolidation)
\- 1 year (travel time through liner
14 years

| | | |
|---|---|---|
| Maximum volume of seepage | | 322 AF |
| Total pore volume | | 2,400 AF |
| Less initial water content | | - 400 AF |
| Equals maximum storage | | 2,000 AF |
| Storage volume at SR | $\frac{.2}{.3}$ x 2,400 = | 1,600 AF |
| Less initial water content | | - 400 AF |
| Permanent storage (Vr) | | 1,200 AF |

A crude estimate of the time (T) required to reach specific retention moisture content below the impoundment would be:

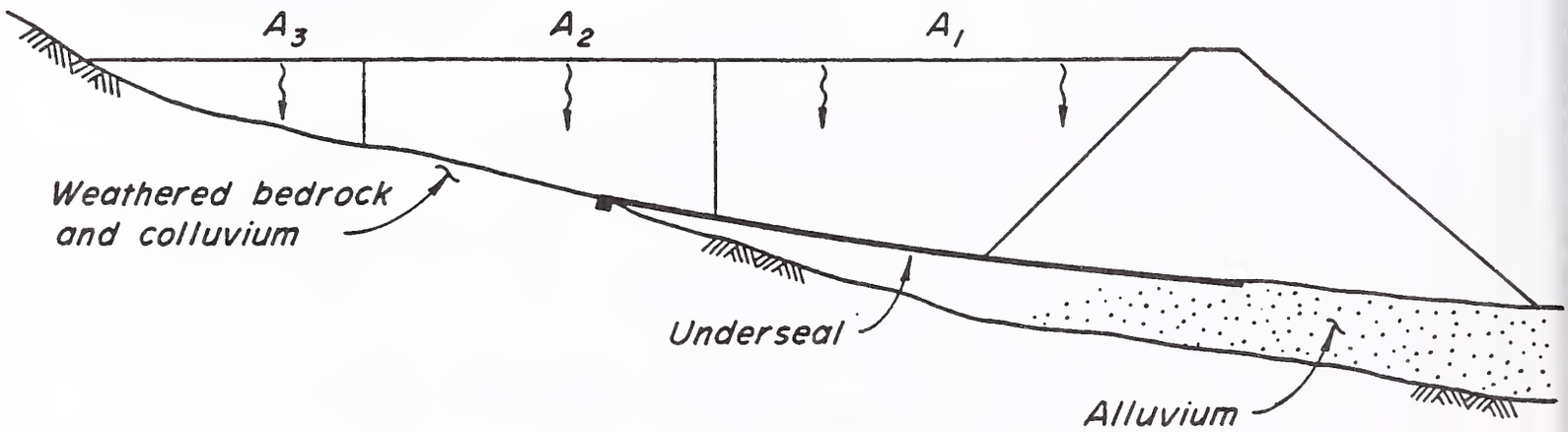
T = Vr/q
= 1,200 AF ÷ 23 AF/yr
= 50 years

TECHNICAL SUPPORT APPENDIX B

# MONTANA TUNNELS PROJECT

## TAILINGS DISPOSAL FACILITY

## CALCULATION OF SEEPAGE QUANTITIES




( NTS )

| Time (Years) | Tailings Elevation (ft) | Surface Area ($10^6$ sq. ft) and Contributing Factor ($F_n$) $A_1(F_1)$ | $A_2(F_2)$ | $A_3(F_3)$ | Average Hydraulic Conductivity (cm/sec) $K_1$ | $K_2$ | $K_3$ |
|---|---|---|---|---|---|---|---|
| 0.5 | 5305 | 1.3 | - | - | $9 \times 10^{-7}$ | - | - |
| | | (1.0) | - | - | | | |
| 1 | 5333 | 1.125 | 1.2 | - | $7 \times 10^{-7}$ | $1 \times 10^{-6}$ | - |
| | | (.484) | (.516) | - | | | |
| 2.5 | 5353 | 1.125 | 2.075 | - | $4 \times 10^{-7}$ | $9 \times 10^{-7}$ | - |
| | | (.352) | (.648) | - | | | |
| 4 | 5410 | 3.1 | 1.9 | 0.3 | $3 \times 10^{-7}$ | $9 \times 10^{-7}$ | $1 \times 10^{-6}$ |
| | | (.585) | (.358) | (.057) | | | |
| 7 | 5460 | 3.1 | 1.9 | 2.6 | $2 \times 10^{-7}$ | $5 \times 10^{-7}$ | $9 \times 10^{-7}$ |
| | | (.408) | (.250) | (.342) | | | |
| 10 | 5500 | 3.1 | 1.9 | 4.6 | $1 \times 10^{-7}$ | $3 \times 10^{-7}$ | $8 \times 10^{-7}$ |
| | | (.323) | (.198) | (.479) | | | |

$F_n = \dfrac{A_n}{A_1 + A_2 + A_3}$ for n = 1, 2, 3 (proportion of area over which infiltration occurs)

$Q = \sum_{n=1}^{3} (F_n)(137{,}000)(K_n)(i)$ (total infiltration through tailings)
where $i \sim 1.0$ (seepage gradient)

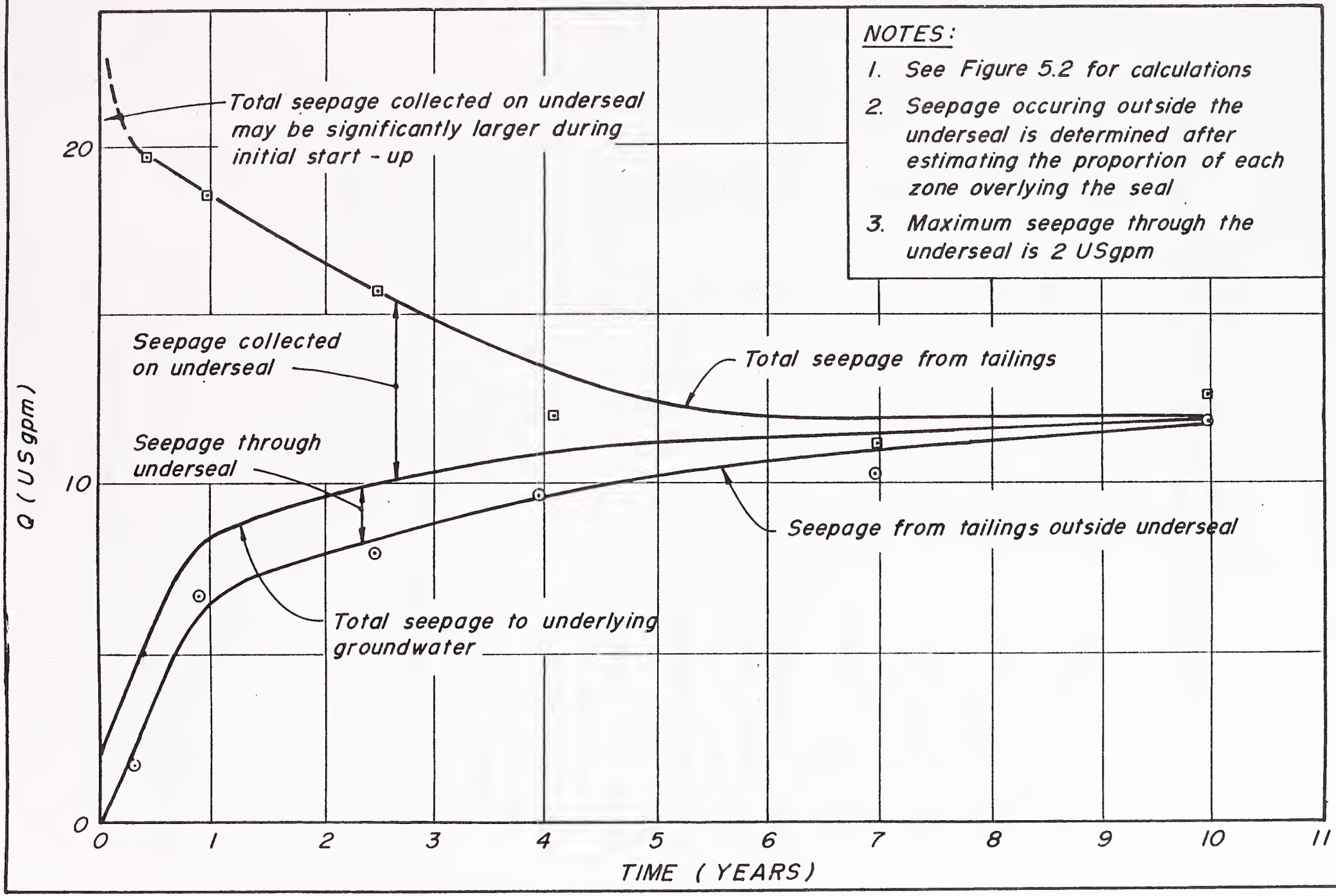
NOTES:

1) Total Infiltration Area is $1.47 \times 10^6$ ft$^2$ (137,000 m$^2$).
2) Hydraulic conductivities ($K_n$) are estimated from the average depth of each zone. A maximum value of $K = 2 \times 10^{-6}$ cm/sec for coarse tailings, and a minimum of $1 \times 10^{-7}$ cm/sec for consolidated tailings.
3) Infiltration quantities are summarized in Figure 5.3.

# MONTANA TUNNELS PROJECT

## TAILINGS DISPOSAL FACILITY

## INFILTRATION THROUGH TAILINGS



## MONTANA TUNNELS PROJECT
## COMPARISON OF TAILINGS FACILITY CHARACTERISTICS

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Tailings Production (tpd) | 14,820 | 6,000 | 1,141 | 1,529 | 3,707 |
| Solids content at discharge (%) | 28 | 50 | 30 | 60 | 35 |
| S.G. of tailings solids | 2.71 | 2.75 | 2.6 | 3.9 | 3.1 |
| Dry density after settling and drainage ($lbs/ft^3$) | 63 | 82 | 25 | 100 | 62 |
| Design dry density ($lbs/ft^3$) | 90(80)* | 100 | 53 | 125 | 94 |
| Coefficient of Consolidation ($ft^2/yr$) | 215 | 215 | 50 | 750 | 650 |
| Mean annual precipitation (ins) | 15.4 | 32 | 17.7 | 115 | 22.2 |
| Mean annual potential evaporation (ins) | 36 | 49 | 20 | 21.5 | 30.1 |
| Surface area of facility (acres) | | | | | |
| - initial (Yr 1) | 55 | 35 | 75 | 45 | 162 |
| - final | 211 | 120 | 100 | 45 | 250 |
| Ratio of required water loss to potential evaporation | | | | | |
| - initial (Yr 1) | 5.2 | 1.61 | 3.36 | 0.67 | 0.86 |
| - final | 1.94 | 0.47 | 2.52 | 0.67 | 0.56 |

(1) Montana Tunnels
(2) Jamestown Mine, California
(3) Key Lake, Saskatchewan
(4) Myra Falls, British Columbia
(5) Gumuskoy, Turkey (Tailings contains 100 ppm cyanide)

* Anticipated dry density 80 $lbs/ft^3$ at Yr 1.

# MONTANA TUNNELS PROJECT

## COMPARISON OF TAILINGS FACILITY DESIGN CRITERIA AND PERFORMANCE

| | Tailings Facility | Maximum calculated seepage rate using worst case assumptions | Measured performance |
|---|---|---|---|
| (1) | Montana Tunnels | 14 gpm at Yr. 10, decreasing to zero at Yr. 15. | (Project under review) |
| (2) | Jamestown Mine, California | 3 gpm at Yr. 2, decreasing to zero at Yr. 11. | (Project under final design) |
| (3) | Key Lake, Saskatchewan | 8.5 gpm at Yr. 1, decreasing to zero at Yr. 14. | Commissioned in October, 1983. Monitoring is by indicator parameters in downstream piezometers. No indication of seepage to date. |
| (4) | Myra Falls, B.C. | 10 gpm at Yr. 3, decreasing to zero at Yr. 15. | Commissioned in July, 1984. Seepage from tailings is collected together with groundwater in hydraulic cut-off system. No separate measurement. Facility performing as designed to date and achieving fully drained, consolidated tailings mass. |
| (5) | Gumuskoy, Turkey | Increasing to 4.5 gpm at Yr. 25, thereafter decreasing to zero. | (Under Construction) |

## DRAINAGE AND DIVERSION

During the operational phase of the Montana Tunnels Project, drainage within or passing through disturbed areas will be controlled to avoid water quality problems and to avoid adverse affects of runoff water on the mining and ore processing operations. The objective of the drainage and diversion plan is to minimize impacts on water resources during the operation and to provide a drainage and diversion system that can easily be integrated into the final reclamation plan. All streams except one within the permit area are ephemeral or intermittent. The only stream that continuously contains water is Pen Yan Creek which carries drainage from abandoned mines. Elements of the drainage and diversion plan are as follows:

1. A major drainage system in the Pen Yan drainage that will transport water to the process water retention pond during the operational phase and ultimately will transport water through the reclaimed mine area.

2. Diversion of runoff waters from waste dumps into the Pen Yan Creek drainage.

3. Diversion of waters from the Washington mine, Minah mine and the Pen Yan drainage to the process water retention pond.

4. A complete sediment control system downstream of disturbed areas that will prevent sedimentation in natural drainages in the area.

The general plan of surface water drainage and diverson is shown in Exhibit II-1. As shown on the exhibit, runoff water will be diverted along the upper (west) edges of the waste dumps and will be transported to the Pen Yan Creek drainage. All diversions are designed to carry runoff from the 100-year, 24-hour precipitation event. A typical cross section of these diversions is shown in Figure II-11. The grade and characteristics of the diversions are summarized in Table II-1. Diversions will not be needed in the open-pit area, the plant area or above the tailings disposal facility.

The major natural drainage system in the area will be maintained, but will be realigned. The Pen Yan drainage and the upper section of the Homestake Creek drainage will be put into a realigned channel to transport runoff through the waste dump area as shown in Exhibit II-1. Diversion culverts are shown on Exhibit II-1 and are characterized in Table II-2. During mining, runoff from these drainages will be diverted to the process water retention pond for use in the milling cycle.

The other water control measure that will be used during the operation will be a diversion system at the toe of the waste dumps. These ditches will intercept any runoff water from the waste dumps and divert

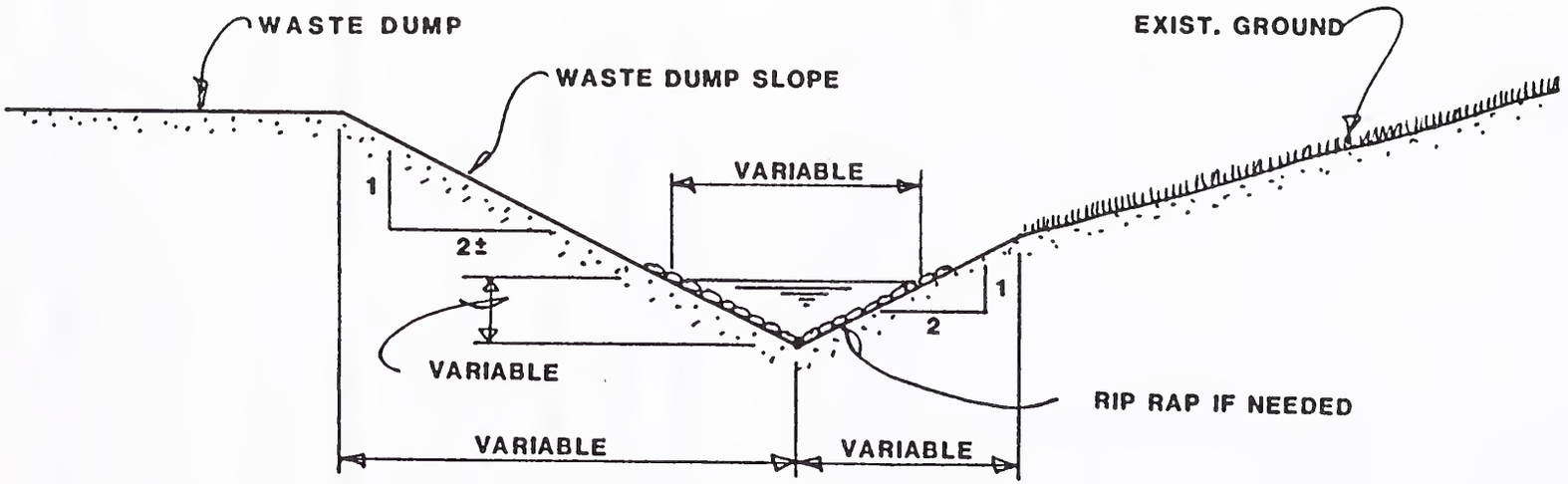



Figure II-11.

TYPICAL DIVERSION CHANNEL CROSS-SECTION

TABLE II-1. DIVERSION CHANNEL CHARACTERISTICS*

| Diversion Channel | Length, L feet | Average Channel Slope, $\bar{S}$ | [1]Depth of Flow, d feet | Top Width of Flow, T, feet | Velocity, v, fps | [2]Mannings "n" | [3]Discharge Q, cfs | Flow Designation | Erosion Control |
|---|---|---|---|---|---|---|---|---|---|
| D1 | 3850 | .0026 | 1.6 | 6.4 | 2.1 | 0.030 | 11 | Subcritical | None |
| [4]D2 | 845 | .047 | 1.7 | 6.8 | 5.0 | 0.055 | 30 | Subcritical | May require rip rap |
| D3 | 1140 | .0175 | 1.4 | 5.4 | 4.1 | 0.035 | 15 | Subcritical | None |
| D4 | 915 | .0109 | 0.9 | 3.6 | 2.8 | 0.030 | 5 | Subcritical | None |
| D5 | 2300 | .0034 | 3.2 | 12.8 | 3.7 | 0.030 | 76 | Subcritical | None |



NOTES: * Channels are sized using Manning's formula for a "v"-section, 2:1 slope.

Channel D1 is located at the west edge of waste dump 5770 and runs north to confluence with Pen Yan Creek.
Channel D2 is located at the west edge of waste dump 5770 and runs north between Pen Yan Creek and Culvert C1
Channel D3 is located at the west edge of waste dump 5740 and runs south from elevation 5740 to Culvert C1.
Channel D4 is located at the west edge of waste dump 5740 and runs north from elevation 5740 to mine pit.

1) Channel will be constructed with at least one foot of vertical freeboard above water surface.
2) Mannings "n" is assumed to be 0.030 in the unlined excavated channel.
3) Design discharge is the 100-year, 24-hour event.
4) Channel D2 will be excavated into existing soil/bedrock to obtain required slope and outlet elevation; waste dump slope at confluence of Channels D1 and D2 with Pen Yan Creek may require rip rap during operations to protect against high-velocity flood flows from Pen Yan Creek.

TABLE II-2. DIVERSION CULVERT CHARACTERISTICS*

| Culvert | Horizontal Length, L feet | Culvert Slope, S | Culvert Diameter d, inches | [2]Estimated Peak Flow Qp, cfs | Discharge Capacity of Culvert - Qc, cfs |
|---|---|---|---|---|---|
| C1[1] | 200 | 0.20 | 18 | 45 | 55 |
| C2[1] | 700 | 0.20 | 24 | 76 | 175 |

Notes: * Culverts are sized using Manning's formula for a circular section, open-channel flow.

1) Outlet will require scour protection; culvert size is based on a Manning's "n" of 0.011.

2) Peak flow for 100-year, 24-hour event.

the water to a series of sediment control ponds. This will prevent any runoff of water into natural streams in the area and will intercept any sediment derived from the waste dumps. During placement of wastes into dumps, sediment control facilities, including the diversions and sediment control structures, will be constructed as needed to completely control runoff and sedimentation. Locations of the planned sediment control diversions are shown in Exhibit II-1 and design details are summarized in Table II-3. Sediment control diversions constructed prior to the final diversion system will have a smaller capacity. A typical cross section of the sediment control ditches is in Figure II-12.

Peak runoff in the area occurs from snowmelt or intense spring or early summer rainfall events. Peak discharge events in undisturbed drainages were estimated using the method described by Parrett and Omang (1981). This flow estimation technique is considered applicable to undisturbed drainages. For runoff from disturbed areas the SCS (1977) technique was used to calculate runoff from the 100 year-24 hour precipitation event.

All diversions will be constructed and, if necessary, riprapped to provide a stable channel profile. Most of the diversions are in bedrock or in coarse granular soils and erosion is not expected to be a problem.

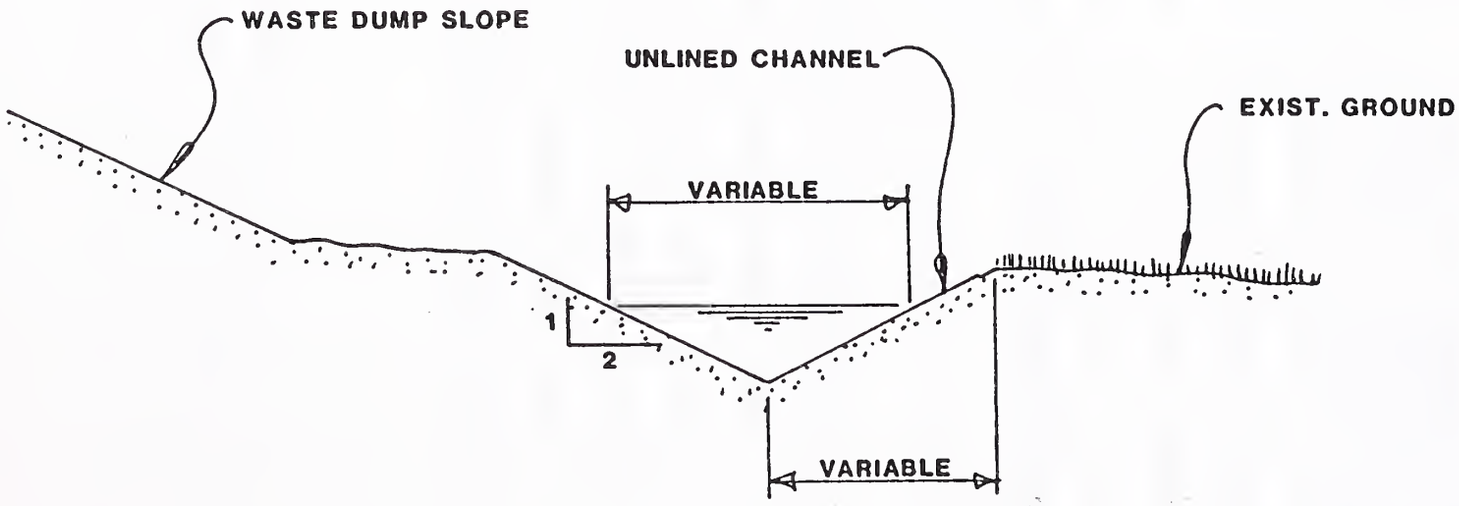



Figure II-12.

TYPICAL SEDIMENT CONTROL DITCH CROSS-SECTION

TABLE II-3.[1] SEDIMENT CONTROL DITCH CHARACTERISTICS*

| Sediment Control Ditch | Length, L feet | Average Channel Slope, S | [2]Depth of Flow, d feet | Top Width of Flow, T, feet | Velocity, v, fps | [3]Mannings "n" | [4]Discharge Q, cfs | Flow Designation | Channel Erosion Control |
|---|---|---|---|---|---|---|---|---|---|
| S1 | 1595 | 0.067+ | 1.0 | 4.0 | 7.5 | .030 | 15 | Supercritical | None |
| S2 | 4900 | 0.052 | 1.8 | 7.2 | 9.8 | .030 | 65 | Supercritical | None |
| S3 | 1200 | 0.062 | 1.0 | 4.0 | 7.3 | .030 | 15 | Supercritical | None |

Notes: * Ditches are sized using Manning's formula for a "v"-section, 2:1 side slope.

Sediment control ditch S1 is located at the south edge of waste dumps 5770 and 5600 and runs east to sediment detention pond "A" (surface elevation 5555±).

Sediment control ditch S2 is located at the south edge of waste dump 5600 and runs northeast to sediment detention pond "B" (surface elevation 5300 ±).

Sediment control ditch S3 is located at the northeast edge of waste dump 5600 and runs southeast to sediment detention pond "B" (surface elevation 5300±).

All ponds will be sized to retain the 100-year, 24-hour precipitation event; decanting may be necessary into the downstream channel to avoid the accumulation of stagnant water; accumulated sediment may need to be dredged from the ponds periodically to maitain the designed water-storage volume.

1) Final operating sediment control system characteristics as shown in Exhibit II-
2) Channel will be constructed with at least one foot of vertical freeboard above water surface.
3) Manning's "n" is assumed to be 0.030 in the unlined excavated channel.
4) Design discharge is the 100-year, 24-hour event.

+ Slope is calculated between elevations 5650 and 5550.

Diversions will be constructed as required during the mining operation. These diversions will be maintained throughout the life of the mine and will be modified as necessary to ensure the diversions are stable. All drainage and diversion structures will be constructed to avoid the accumulation of stagnant water. Upon completion of the mining operation, the diversion and drainage system will be integrated into a post-mine diversion and drainage system as described in the RECLAMATION PLAN section of this permit application.

600 copies of this public document were published at an estimated cost of $2.36 per copy, for a total cost of $1,416.00, which includes $1,416.00 for printing and $.00 for distribution.